NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 1-65
18 January 1965

FOR RELEASE: IMMEDIATELY

After 21 months in Alagoa Grande, Brazil, Eunice Siebert has chosen the Antelope Valley for her new home.

Miss Siebert, who has just joined the National Aeronautics and Space Administration's Flight Research Center as a secretary in the Research Division, has recently completed two years of service in the U.S. Peace Corps.

During most of the two years she lived in the small community of Alagoa Grande, which is located in the northeastern portion of Brazil.

Miss Siebert was connected with the 4-S organization which is the Brazilian counterpart of our 4-H organization. She worked closely with the local Brazilians in various agricultural and home economic projects.

She reports that her arrival in Alagoa Grande was met with the natural shyness and curiousity of people who had never seen an American. Once the people realized that Eunice was there solely to help them, they were friendly and hospitable. She was pleasantly surprised to find that her team had been assigned to a village that had running water and electricity most of the day. Others, not so lucky, had only 2 or 3 hours of electricity during the day.

When asked if she thinks the Peace Corps is accomplishing its objectives, she replied, "The Peace Corps isn't quite 5 years old yet. In a few more years the results of their work will be more visible. After all, you can't expect to change a culture that is many centuries old in 2 or 3 years."

MORE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

ENGLE SCHEDULED FOR RELATIVELY HIGH SPEED X-15 FLIGHT

The 126th flight in the joint NASA-USAF X-15 research program is scheduled for January 29 with Captain Joe H. Engle as the pilot. The flight will obtain data for several research programs.

At the present time, NASA is studying several types of ablative materials for use in dissipating heat that may be incurred on future high speed flights in the X-15 number two. One of these types of ablative material has been coated over the entire portion of the lower vertical tail and on a small panel on the nose of the X-15 number three for this flight. The flight will then evaluate how well the ablative material adheres to the surface of the aircraft and how well it reduces the surface heat on

MORE

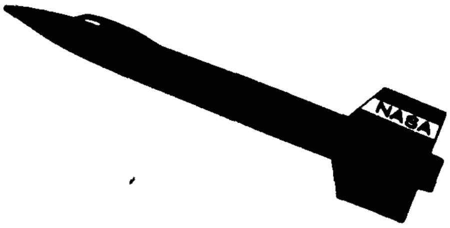
the coated portions at relatively high speeds. Maximum temperatures of approximately 1000 degrees F are expected to be encountered on this flight.

Other instrumentation on the aircraft will measure the noise level of the boundary layer of air that surrounds the X-15 in flight. Special instruments are also mounted on the aircraft to record skin friction, one of the main causes of heating.

The flight will be air launched near Delamar Lake, Nevada, 240 miles northeast of here. Engle is scheduled to let the rocket engine, which is rated at 59,500 lbs. of thrust for this flight, burn for 82.5 seconds which should propell him to a maximum speed of approximately 3850 miles per hour. Peak altitude will be about 90,000 feet during the planned 11 minute flight.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California



FACT SHEET

FLIGHT:	126 (40 for X-15 number 3)
PILOT:	Captain Joe H. Engle, USAF
NASA 1:	Milton O. Thompson, NASA
B-52 TAKE OFF:	1000 January 29, 1965
X-15 LAUNCH:	1100 January 29, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	240 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3850 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 90,000 feet
PROGRAMMED ENGINE BURN TIME:	82.5 seconds
PROGRAMMED ENGINE THRUST:	59,500 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 2-65
28 January 1965

FOR RELEASE: IMMEDIATELY

X-15 PILOT TO ADDRESS PASADENA MEMBERSHIP DRIVE DINNER

X-15 pilot John B. McKay will address the kick-off dinner for the Pasadena YMCA's 1965 Membership Enrollment Campaign on February 2, 1965. The meeting will be held at the Pasadena YMCA and will begin at 6:30 p.m.

McKay is a civilian pilot-engineer for the National Aeronautics and Space Administration's Flight Research Center and has been a member of the X-15 pilot team since the beginning of its flight test program. He has piloted the rocket powered aircraft at speeds in excess of 3800 miles per hour, more than five times the speed of sound.

MORE

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FRC NEWS RELEASE 3-65
1 February 1965

FOR RELEASE: IMMEDIATELY

X-15 PILOT TO ADDRESS NATIONAL PLASTICS CONVENTION

X-15 pilot Milton O. Thompson will be the principal luncheon speaker at the 20th Annual Conference of the Society of Plastics Industry Reinforced Plastics Division on February 4, in Chicago, Ill. The meeting will be held in the Edgewater Beach Hotel.

Thompson is a civilian pilot-engineer for the National Aeronautics and Space Administration's Flight Research Center, Edwards, California. He was selected as a member of the X-15 pilot team in 1963 and has since piloted the rocket powered aircraft at speeds in excess of 3600 miles per hour, better than five times the speed of sound.

MORE

The three X-15 aircraft have made over 125 flights in the research program that is providing in-flight information and data on aerodynamics, structures, flight controls, and the physiological aspects of high-speed, high-altitude flight. A follow-on program utilizes the aircraft as a test bed to carry various scientific experiments beyond the earth's atmosphere.

In addition to the X-15, Thompson is the project pilot, and the first man to fly, the wingless M-2 Lifting Body. The lifting body type of vehicles are being studied by NASA for possible future use as a spacecraft capable of returning to earth and landing in a manner similar to conventional aircraft.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 4-65
1 February

FOR RELEASE: 4 February 1965

Milton Thompson, an X-15 pilot for the National Aeronautics and Space Administration's Flight Research Center, displays two models of the X-15 research aircraft; one with its conventional black coloring and the other coated with a sample of ablative material. The aircraft would be almost completely coated with ablative material to dissipate heat incurred on possible high speed flights in the modified X-15 number two.

NASA is currently evaluating several different brands of ablative material for their effectiveness in reducing heat and for their ease of application.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 5-65
1 February 1965

FOR RELEASE: IMMEDIATELY

NASA SEEKS LIFTING BODY STUDY CONTRACTS

The National Aeronautics and Space Administration today sent out requests for two preliminary feasibility studies of a manned lifting reentry vehicle. NASA's Flight Research Center submitted the request for proposals to 16 industrial firms.

The studies call for two contracts based on separate approaches with the objective of investigating a vehicle concept whose sole mission is basic research involved with the reentry of a manned lifting body (glider-type from orbital flight). Because the study vehicle is intended as a research craft built solely to advance lifting body technology, it would be of

MORE

limited complexity with a one-man crew and minimum cost.

The primary objective of the proposed studies is to determine problem areas and their influence on design and to provide accurate estimates of the weight, cost, and developmental schedule involved with such a research craft. The contractors will be required to perform conceptual designs. No mission or research plan has been determined by NASA for design or construction of an actual vehicle.

For purposes of the study, the design mission of the lifting body research vehicle would consist of a launch from Cape Kennedy with a global flight to a landing on a dry lake bed near NASA's Flight Research Center.

Closing date for the submission of proposals is March 8. Two separate fixed price contracts are expected to be awarded by April 30, 1965.

END

NEWS RELEASE

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FLIGHT RESEARCH CENTER, Edwards, Calif.
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FRC NEWS RELEASE 6-65
10 February 1965

FOR RELEASE: Monday A.M.
15 February 1965

MINIATURE MASS SPECTROMETER FLIGHT TESTED BY NASA

A miniature analyzer capable of detecting the presence of harmful biological gases in a spacecraft has completed its preliminary flight testing at the National Aeronautics and Space Administration's Flight Research Center. This was the first successful flight test of a sophisticated mass spectrometer designed specifically for biomedical and environmental use.

The small analytical system weighs only 46 pounds and measures 10 x 10 x 20 inches with vacuum system, which would not be required for space use. It monitors and chemically analyzes samples of gases that may be encountered in either the cockpit environment of the spacecraft or in the

MORE

pilot's respiratory system. As such, it can detect the build up of a harmful gas or the absence of necessary life support gas.

Four capillary inlets are mounted in the cockpit and a fifth one is located at the nostril of the pilot's nose. Gas samples are collected from these inlets and fed to a double focusing, electrical and magnetic, mass spectrometer that provides continuous breath-by-breath monitoring of the masses of 11 different gases. Data is then acquired by onboard recorders or relayed to the ground by telemetry for analysis. 11 gases having a mass between 2 and 100 can be monitored continously and the same entire mass range can be scanned.

According to Dr. James Roman, chief of biomedical research for NASA's Flight Research Center, the preliminary flight tests provided an operational check-out of the system in flight. Cockpit and pilot samplings of four different gases, nitrogen, oxygen, carbon dioxide, and water vapor, were collected during the flights.

Dr. Roman reported that the compact system was easy to use operationally and no major reliability problems were encountered.

The mass spectrometer will next be flight tested in a high speed jet fighter type aircraft.

The mass spectrometer was built by the Consolidated Systems Corporation, Monrovia, California.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 7-65
16 February 1965

FOR RELEASE: Sunday A. M.
21 February 1965

NASA AWARDS VISUAL SIMULATOR CONTRACT TO DALTO ELECTRONICS

The National Aeronautics and Space Administration's Flight Research Center awarded a $183,300 contract on February 12 to the Dalto Electronics Corporation, Norwood, N.J., for the design and construction of a closed circuit visual simulator system. The system will be used as a general purpose visual simulator that will display to the pilot almost all of the normal visual information, both sky and terrain, that he would normally observe through the window of his aerospace vehicle.

A typical simulator mission would consist of an approach, at altitudes up to 150,000 feet, to the terminal area, navigation and energy management, descent, maneuvering and landing. At maximum altitude, ground speeds up to 7000 miles per hour can be simulated.

MORE

The pilot will sit in a fixed-base cockpit with his flight controls connected to an analog computer which will compute the simulated movement of his vehicle. These computations will then also be fed to a spot scanner camera system which is focused on a color transparency of the desired ground area. Simulated vehicle movement, both horizontally and vertically, is accomplished by electronically moving the transparency. Pitch, roll and yaw movements of the simulated vehicles are controlled by moving different components of the camera system.

The viewed ground area ranges from a diameter of 418 nautical miles at maximum altitude to 7.5 nautical miles at the minimum altitude of 15 feet. This is accomplished through the use of three transparencies and two television cameras. The projected image will be in color and in proper perspective of sky, horizon, haze, and terrain. Color will change from blue-black at peak altitude to light blue at low level.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 8-65
17 February 1965

FOR RELEASE: IMMEDIATELY

NASA MAKES NOISE COMPARISON BETWEEN B-70 AND JET AIRLINER

A direct comparison of the noise levels generated by the North American Aviation/Air Force XB-70 and a commercial jet transport was obtained February 16 by engineers of the National Aeronautics and Space Administration's Flight Research Center. The measurements were recorded as the XB-70 took off from Palmdale, California for a flight to Edwards Air Force Base.

Immediately after the XB-70 departed Palmdale, a Trans World Airline 707-120B jet transport made two normal landings and take offs. NASA engineers recorded the noise levels of both aircraft under the same atmospheric conditions.

MORE

NASA made the measurements as part of its general study of runway noise conditions for use in the design of a supersonic transport. The use of the XB-70 and the 707 allowed the actual comparison of a present-day jet transport and a military aircraft with the size and performance characteristics that are applicable to the planned supersonic transport.

Because noise level is affected by temperature, pressure, relative humidity, and wind condition, it was important to obtain the measurements from the two aircraft under the same atmospheric conditions.

NASA engineers positioned eight recording stations along the 12,000 foot runway and North American Aviation had stationed more microphones at the three mile position from the beginning point of the take off. This is the present standard distance used by commercial airports in determining community noise problems. The noise measurements were recorded in two portable vans.

Data from the measurements is being reduced and will be analyzed at NASA's Flight Research Center for the next several weeks.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

RUSHWORTH SCHEDULED FOR 127TH X-15 FLIGHT

Major Robert A. Rushworth is scheduled to fly the X-15 number two on February 17 on the 127th flight in the joint NASA-USAF research program. The flight is scheduled to obtain data for several research programs.

The number two X-15 has increased its weight with the addition of several new scientific experiments. Measurements will be taken on this flight to evaluate the effects of this added weight.

During the ten minute flight, Major Rushworth will disengage various automatic control systems. With these systems inoperative, he will make controlled maneuvers to record data on the natural stability of the airplane.

During the final portions of the flight, Major Rushworth will perform a maneuver to test the star tracking cameras mounted on the aircraft. The test is designed to check the operation of the cameras and no star pictures will be obtained on this flight. Later flights at

MORE

relatively high altitudes will obtain scientific pictures of the stars.

The flight will be air launched near Mud Lake, Nevada, approximately 220 miles north of here. A peak altitude of about 96,000 feet and a maximum velocity of approximately 3550 is planned.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	127 (36 for X-15 number 2)
PILOT:	Major Robert A. Rushworth, USAF
NASA 1:	John B. McKay, NASA
B-52 TAKE OFF:	1000 February 17, 1965
X-15 LAUNCH:	1100 February 17, 1965
LAUNCH AREA:	Mud Lake, Nevada
FLIGHT DISTANCE:	220 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3550 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 96,000 feet
PROGRAMMED ENGINE BURN TIME:	81.5 seconds
PROGRAMMED ENGINE THRUST:	60,000 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

MCKAY TO MAKE ALTITUDE CHECKOUT FLIGHT IN X-15

NASA research pilot Jack McKay is scheduled to fly the X-15 number one on February 26 ~~December 23~~ in the 129 ~~125~~th flight in the joint NASA-USAF research program. One of the main objectives of the flight is to familiarize both the pilot and aircraft with high altitude flight. A peak altitude of about 180,000 feet, almost 35 miles high, is planned.

This will be the highest flight for the number one X-15 since a new inertial guidance system was installed on the aircraft last summer at NASA's Flight Research Center. This guidance system was originally designed by the Honeywell Corp. for use on the X-20 Dyna Soar.

Two wing tip containers were also installed at that time that are being used to carry scientific equipment. On this flight, the equipment will be used to measure air density, the intensity of the sky's background, and the resolution of the earth's horizon.

MORE

The X-15 will be air-launched from a B-52 near Delamar Lake, Nevada. After launch, McKay will ignite the rocket engine of the X-15 and climb at an angle of approximately 28 degrees. He will cut off the engine as he reaches a maximum speed of about 3600 miles per hour, about 83 seconds after launch. Peak altitude will be reached approximately 145 seconds after launch.

Reentry into the earth's atmosphere will be accomplished using 20 degrees of speed brake and an angle of attack of about 20 degrees. Maximum heating is not expected to exceed 1100 degrees F.

The 220 mile trip will take about 10 minutes.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	~~125~~ 129 (52 for X-15 number 1)
PILOT:	John B. McKay, NASA
NASA 1:	Milton O. Thompson, NASA
B-52 TAKE-OFF:	0900 ~~23 December~~ 26 February 1964
X-15 LAUNCH:	1000 ~~23 December~~ 26 February 1964
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	220 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALITTUDE:	Approximately 180,000 feet
PROGRAMMED ENGINE BURN TIME:	83 seconds
PROGRAMMED ENGINE THRUST:	57,000 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 9-65
March 2, 1965

FOR RELEASE: IMMEDIATELY

NASA HEAT FACILITY CONSTRUCTION CONTRACT AWARDED

A $1,366,511 contract for the construction of a high temperature heat load testing facility was awarded today to the Santa Fe Engineers, Inc., Lancaster, California. The contract was awarded by the U.S. Army Corps of Engineers District, Los Angles, who is administering the contract for the National Aeronautics and Space Administration. The new facility will be constructed at NASA's Flight Research Center, Edwards AFB, California.

The new building will include enough test area, approximately 20,000 square feet, to permit heat load testing of actual aircraft of extreme size. Included in the contract is the construction of a concrete taxiway for easy access to the hangar-type building.

MORE

When completely operational, the facility will be cabale of producing temperatures up to 3,000 F. on small isolated areas of the aircraft. Larger areas, such as the major portion of a wing, can be heated up to about 600 degrees.

Electrically controlled hydraulic equipment will be used to include simulated aerodynamic loads during the heating tests.

The contract calls for the facility to be completed in nine months. Actual construction is expected to begin in the near future.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

X-15 FLIGHT TO MEASURE EARTH'S RADIATION

Major Robert A. Rushworth, USAF, is scheduled to fly the number one X-15 on March ~~25~~ 26 in the 129th flight in the joint NASA-USAF X-15 research program.

NASA engineers have installed a scanning radiometer on the number one X-15. This device will measure infrared radiation transmitted from the earth through the atmosphere. The radiometer will record the reflected solar radiation as well as radiation radiation emitted by the earth.

The flight is also designed to obtain more check-out information on the new inertial guidance system that was installed on the aircraft last summer. The new system, which uses a digital computer, was originally designed for use in the X-20 Dyna Soar.

MORE

The X-15 will be air launched from a B-52 near Delamar Lake, Nevada. The rocket engine is slated to run for about 75 seconds before Rushworth stops it. This should propel the aircraft to a maximum speed of approximately 3500 m.p.h. and a peak altitude of about 104,000 feet. The 250-mile trip should last about 11 minutes.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	129 (53 for X-15 number 1)
PILOT:	Major Robert A. Rushworth, USAF
NASA 1:	John McKay, NASA
B-52 TAKE OFF:	9:30 March ~~25~~ 26, 1965
X-15 LAUNCH:	10:30 March ~~25~~ 26, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 104,000 feet
PROGRAMMED ENGINE BURN TIME:	75 seconds
PROGRAMMED ENGINE THRUST:	60,500 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

X-15 TO MAKE HEAT TRANSFER FLIGHT

The 130th flight in the joint NASA-USAF X-15 research program is scheduled for April 23 with Captain Joe Engle as the pilot. The flight is designed primarily to obtain information concerning the heat caused by the friction of air against the surface of the X-15. As such, the flight is planned to remain at a relatively low altitude, 78,000 feet, where there is still dense air.

MORE

To determine how this heat is affected by the airflow, NASA engineers have installed two heavily instrumented panels on the underside of the nose of the aircraft. One panel has a smooth surface and the other has wavy ridges on it. A comparison of the temperatures obtained from the two panels will be made to determine the effects of the distorted airflow.

To study methods of reducing the temperatures on the skin of the X-15, an ablative material will be carried on this flight. The lower potion of the top vertical tail on the X-15 will be covered with this ablative material that dissipates heat by charring and burning itself up. NASA engineers estimate that on this flight, the ablative material will reduce the heat on this portion of the aircraft by approximately 50%.

The X-15 will be air launched near Hidden Hills, California. The rocket engine is scheduled to run for 93 seconds which should propel the aircraft to its peak altitude of about 78,000 feet and a maximum speed of approximately 3500 m.p.h. The 150-mile trip should take about 9 minutes. Peak temperatures should not exceed 1000° F.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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Edwards, California

FACT SHEET

FLIGHT:	130 (41 for X-15 number 3)
PILOT:	Captain Joe Engle, USAF
NASA 1:	Milton O. Thompson, NASA
B-52 TAKE OFF:	9:00 April 23, 1965
X-15 LAUNCH:	10:00 April 23, 1965
LAUNCH AREA:	Hidden Hills, California
FLIGHT DISTANCE:	150 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 78,000 feet
PROGRAMMED ENGINE BURN TIME:	Approximately 93 seconds
PROGRAMMED ENGINE THRUST:	58,750 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

MCKAY SCHEDULED FOR X-15 LANDING GEAR CHECKOUT FLIGHT

NASA research pilot John B. McKay is scheduled to fly the number two X-15 on April 28 in the 131st flight in the joint NASA-USAF X-15 research program. The flight is designed to check landing gear modifications performed on the aircraft following its last flight.

The number two X-15 was last flown on February 17, 1965 by Major Robert Rushworth and reached a maximum velocity of 3539 m.p.h. and a peak altitude of 95, 100 feet. On that flight, as the aircraft was slowing down through a speed of about 2900 m.p.h. and at an altitude of approximately 81, 000 feet, the right main landing gear extended. The aircraft continued its flight with the right landing gear extended and made a normal landing.

MORE

The main landing gear on the number two X-15 (this is the X-15 that received major modifications following a landing accident in November 1962) are about 19 inches longer than the landing gear on the other two X-15 aircraft. In flight, the landing gear are folded flat against the sides of the X-15 and held in position by a mechanical lock.

NASA and North American Aviation engineers have determined that the premature landing gear extension was due to heat expansion. In flight, the temperature of the side of the landing gear that is against the side of the X-15 is about 200 degrees F. The outside edge of the landing gear that is exposed to air friction heats up to approximately 700 degrees F. This 500 degree gradient causes the landing gear to expand. This expansion caused the landing gear to bow and overstress the landing gear lock which resulted in the premature extension of the landing gear.

The landing gear lock has now been reworked to include a mechanical spring arrangment that will allow the gear to bow and expand without overstressing the lock.

The scheduled flight will also obtain stability and control information. Pilot McKay will perform several control maneuvers, including a 15 degree left turn at a speed of approximately 3000 m.p.h.

MORE

The X-15 will be air launched from a B-52 near Hidden Hills, California. The flight plan calls for a maximum speed of about 3200 m.p.h. and a peak altitude of approximately 84,000 feet. The 150-mile trip should take about eight minutes.

END

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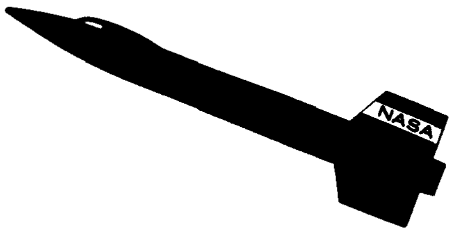

FACT SHEET

FLIGHT:	131 (37 for X-15 number 2)
PILOT:	John B. McKay, NASA
NASA 1:	Major Robert Rushworth, USAF
B-52 TAKE OFF:	11:00 April 28, 1965
X-15 LAUNCH:	11:45 April 28, 1965
LAUNCH AREA:	Hidden Hills, California
FLIGHT DISTANCE:	150 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3200 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 84,000 feet
PROGRAMMED ENGINE BURN TIME:	Approximately 83 seconds
PROGRAMMED ENGINE THRUST:	59,000 lbs.
SUPPORT PERSONNEL	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 11-65
April 29, 1965

FOR RELEASE: Friday
April 30, 1965

NASA AWARDS TWO LIFTING BODY STUDY CONTRACTS

The National Aeronautics and Space Administration's Flight Research Center, Edwards, California, today awarded separate lifting body study contracts to the McDonnell Aircraft, Co., St. Louis, Mo., and Northrop Norair, a division of the Northrop Corp., Hawthorne, Calif.

The two separate six-month studies will investigate a vehicle concept whose sole mission is the basic research involved with the reentry of a manned lifting body from orbital flight. Preliminary objectives include the determination of problem areas and their influence on design.

MORE

No mission or research plan has been determined by NASA for the design or construction of an actual vehicle.

Both contracts were fixed price; Norair received $150,000 and McDonnell received $152,496. A total of eight industrial firms submitted proposals.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

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MORE

The main landing gear on the number two X-15 (this is the X-15 that received major modifications following a landing accident in November 1962) are about 19 inches longer than the landing gear on the other two X-15 aircraft. In flight, the landing gear are folded flat against the sides of the X-15 and held in position by a mechanical lock.

NASA and North American Aviation engineers have determined that the premature landing gear extension was due to heat expansion. In flight, the temperature of the side of the landing gear that is against the side of the X-15 is about 200 degrees F. The outside edge of the landing gear that is exposed to air friction heats up to approximately 700 degrees F. This 500 degree gradient causes the landing gear to expand. This expansion caused the landing gear to bow and overstress the landing gear lock which resulted in the premature extension of the landing gear.

The landing gear lock has now been reworked to include a mechanical spring arrangment that will allow the gear to bow and expand without overstressing the lock.

The scheduled flight will also obtain stability and control information. Pilot McKay will perform several control maneuvers, including a 15 degree left turn at a speed of approximately 3000 m.p.h.

MORE

The X-15 will be air launched from a B-52 near Hidden Hills, California. The flight plan calls for a maximum speed of about 3200 m.p.h. and a peak altitude of approximately 84,000 feet. The 150-mile trip should take about eight minutes.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	131 (37 for X-15 number 2)
PILOT:	John B. McKay, NASA
NASA 1:	Major Robert Rushworth, USAF
B-52 TAKE OFF:	11:00 April 28, 1965
X-15 LAUNCH:	11:45 April 28, 1965
LAUNCH AREA:	Hidden Hills, California
FLIGHT DISTANCE:	150 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3200 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 84,000 feet
PROGRAMMED ENGINE BURN TIME:	Approximately 83 seconds
PROGRAMMED ENGINE THRUST:	59,000 lbs.
SUPPORT PERSONNEL	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 11-65
April 29, 1965

FOR RELEASE: Friday
April 30, 1965

NASA AWARDS TWO LIFTING BODY STUDY CONTRACTS

The National Aeronautics and Space Administration's Flight Research Center, Edwards, California, today awarded separate lifting body study contracts to the McDonnell Aircraft, Co., St. Louis, Mo., and Northrop Norair, a division of the Northrop Corp., Hawthorne, Calif.

The two separate six-month studies will investigate a vehicle concept whose sole mission is the basic research involved with the reentry of a manned lifting body from orbital flight. Preliminary objectives include the determination of problem areas and their influence on design.

MORE

No mission or research plan has been determined by NASA for the design or construction of an actual vehicle.

Both contracts were fixed price; Norair received $150,000 and McDonnell received $152,496. A total of eight industrial firms submitted proposals.

END

NEWS RELEASE

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Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 12-65
May 3, 1965

FOR RELEASE: Sunday
May 9, 1965

LIFTING BODY LANDING APPROACH BEING STUDIED

Flight handling qualitites of a manned lifting body reentry vehicle during the later stages of reentry and during the landing approach are being studied at the National Aeronautics and Space Administration's Flight Research Center, Edwards, California. The studies are being conducted jointly by NASA and the Cornell Aeronautical Laboratory, Inc., Buffalo, New York, using a T-33 jet aircraft specifically modified for the USAF Systems Command by Cornell.

The variable stability T-33 is equipped with special wing tip pods that contain pilot controlled drag devices. With the devices extended, the T-33 attains a 2.5 lift to drag ratio, approximately the

MORE

same lift-drag ratio that is expected to be achieved with the heavyweight M-2 lifting body that will be flown by NASA later this year.

The test flights include simulating the landing approach of the heavyweight M-2 lifting body. The approach is begun at approximately 23,500 feet and includes a 360 degree turn at a constant glide angle at about 250 knots. The simulation ends about 600 feet above the ground. Both NASA and Cornell pilots are flying the maneuvers.

Cornell is working under a NASA funded $231,000 contract which also includes human transfer-function studies and ground simulation of the lifting body.

END

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This flight was cancelled until May 18, 1965

MCKAY TO MAKE STABILITY TESTS IN X-15

NASA research pilot John B. McKay is scheduled to fly the number two X-15 on May ~~13~~ in the 132nd flight in the joint NASA-USAF X-15 research program. The flight is designed as a stability and control evaluation and as an operational check of the star tracking cameras that have been installed on the aircraft.

During the research portion of the flight, McKay will perform several control pulses with various electronic control dampers intentionally turned off. These control pulses are designed to disturb the aircraft's natural stability so that measurements can be taken of the resulting aircraft movements. These maneuvers will be performed at

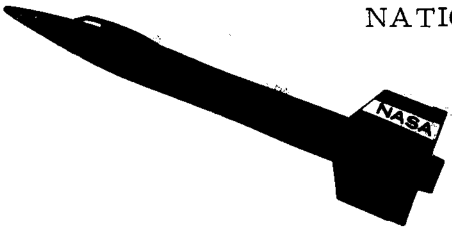
MORE

altitudes from 96,000 to 71,000 feet and at speeds from 3400 to 1600 m.p.h.

After completing the control tests, McKay will make a 20 degree right turn during which time he will perform a functional check of the star tracking cameras that are mounted in a compartment on the top side of the aircraft. On later flights, doors on the top of the X-15 will open and allow the cameras to take energy-emission pictures of the stars. On McKay's flight, the doors will remain closed and only the cameras will be tested for correct operation.

The X-15 will be air launched from a B-52 near Mud Lake, Nevada, approximately 250 miles north of here. The rocket engine is slated to burn for 81 seconds which should propel the aircraft to a peak altitude of approximately 96,000 feet and a top seed of about 3600 m.p.h. The flight should take about 10 minutes.

END



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	132 (38 for X-15 number 2)
PILOT:	John B. McKay, NASA
NASA 1:	Major Robert Rushworth, USAF
B-52 TAKE OFF:	9:00 May ~~13~~, 1965
X-15 LAUNCH:	10:00 May ~~13~~, 1965
LAUNCH AREA:	Mud Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3600 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 96,000 feet
PROGRAMMED ENGINE BURN TIME:	Approximately 81 seconds
PROGRAMMED ENGINE THRUST:	59,750 lbs.
SUPPORT PERSONNEL	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

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FLIGHT RESEARCH CENTER
Edwards, California

XFRC

X-15 TO OPEN STARTRACKER DOORS

NASA research pilot John B. McKay is scheduled to fly the number two X-15 on June 4, on the 135 flight in the joint NASA-USAF X-15 research program. One of the primary objectives of the flight is to obtain an operational check out of the star tracking cameras that are mounted in the top of the X-15 number two.

After reaching the planned peak altitude of 160,000 feet, McKay will turn on an electronic switch that opens the two 7 x 13 inch clamshell doors, exposing the four star cameras, and activates the star tracking guidance system. A new cockpit instrument, showing the attitude of the X-15 in all three axes, is then used by McKay to position the X-15 so that the star tracking cameras remain focused on a particular star.

MORE

For this operational checkout, no star has been designated as a target. On data seeking flights, ground computed position coordinates of the subject star will be fed to the star tracking guidance systems and the new cockpit instrument.

The four 35mm cameras are configured with ultra violet filters. Pictures obtained from the cameras will actually be energy emissions of the star and will be used to verify the theoretical physical and chemical composition of the star.

The flight will also collect data on the landing gear modifications that were performed on the number two X-15. Several stability and control maneuvers are also scheduled during the 10 minute flight.

The X-15 will be air launched from a B-52 near Mud Lake, Nevada, about 250 miles north of here. The rocket engine is slated to burn for 83 seconds which should propel the X-15 to a maximum speed of approximately 3700 m.p.h.

END

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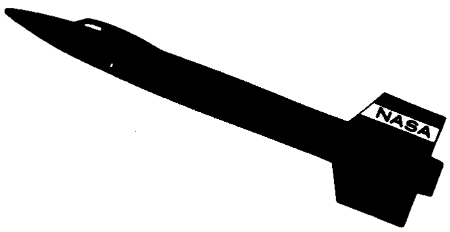

FACT SHEET

FLIGHT:	135 (39 for X-15 number 2)
PILOT:	John B. McKay, NASA
NASA 1:	Captain Joe Engle, USAF
B-52 TAKE OFF:	9:00 June 4, 1965
X-15 LAUNCH:	10:00 June 4, 1965
LAUNCH AREA:	Mud Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3700 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 160,000 feet
PROGRAMMED ENGINE BURN TIME:	Approximately 83 seconds
PROGRAMMED ENGINE THRUST:	60,000 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

X FRC

ENGLE TO PILOT X-15 TO 283,000 FEET

Captain Joe H. Engle, USAF, is scheduled to fly the number three X-15 on June 25 in the 138th flight in the joint NASA-USAF X-15 research program. The flight will gather scientific data for use in the design of future advanced aircraft and navigation systems for manned spacecraft. Also, if the flight exceeds an altitude of 264,000 feet (50 miles), the 32 year old pilot will have met the requirements for the military rating of astronaut.

On this flight, the number three X-15 will carry a horizon scanner, developed by NASA's Langley Research Center, Hampton, Virginia, which is used to measure and define the earth's horizon in

MORE

the near infrared spectrum. This scanner will view to the rear of the aircraft. Data obtained from this experiment is used to establish design criteria for navigational instruments that will be used in future spacecraft.

A second scanner, is also mounted on the tail of the aircraft. This scanner views to the side of the aircraft. As the X-15 climbs to altitude, Captain Engle will roll the aircraft plus and minus five degrees so that the side viewing scanner will continuously scan the horizon. These measurements will be in the ultra violet spectrum.

Five special microphones have been installed on the aircraft; two on the right forward side of the fuselage, two on the left rear side of the fuselage, and one on the right part of the top vertical tail. These microphones will be used to record the noise intensity of the turbulent air that flows next to the skin of the X-15. Data from these recordings, coupled with measurements obtained with strain gauges, are used to predict possible structural fatigue of the metal. This data, the only actual high speed flight data available, will provide a design foundation for use in the planned supersonic transport program.

NASA engineers predict that the noise levels recorded will be in the 140 - 150 decibel range, about as lound as sounding an automobile horn next to a human ear.

The flight is scheduled to be air launched from a B-52 near

MORE

Delamar, a dry lake bed 60 miles north of Las Vegas. The rocket engine, rated at 58,750 pounds of thrust for this flight, is slated to burn for 82 seconds. This should propel the X-15 to a maximum speed of 3500 m.p.h.

After launch, Engle will climb the aircraft at an angle of about 42 degrees. The rocket engine will be cut off at approximately 147,000 feet and the X-15 will continue on its ballistic flight path. The planned peak altitude of 283,000 feet should be reached about 175 seconds after launch.

Reentry will be accomplished using 20 degrees of speed brakes and an angle of attack of approximately 23 degrees. Maximum temperatures on the aircraft should not exceed 1000 degrees F. The pull out will be made with a maximum of five 'g' (acceleration units).

The 250-mile (straight line) flight will take about 12 minutes and will terminate with a 200 m.p.h. landing on Rogers dry lake.

END

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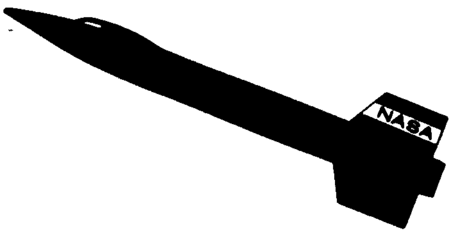

FACT SHEET

FLIGHT:	138 (44 for X-15 number 3)
PILOT:	Captain Joe Engle, USAF
NASA 1:	Milton O. Thompson, NASA
B-52 TAKE OFF:	9:00 June 25, 1965
X-15 LAUNCH:	10:00 June 25, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 283,000 feet
PROGRAMMED ENGINE BURN TIME:	82 seconds
PROGRAMMED ENGINE THRUST:	58,750 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

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X FRC

X-15 TO PHOTOGRAPH THE STAR GAMMA CASSIOPEIA

NASA research pilot John B. McKay is scheduled to fly the number two X-15 on July 1 on the 139th flight in the joint NASA-USAF X-15 research program. The flight will carry a special spectrograph to aid in the selection of proper ultraviolet wave lengths for use by the X-15's star cameras.

On this flight, the cameras will obtain pictures of the star Gamma Cassiopeia, a dim star located 65 degrees north of the equator.

The cameras, four 35mm cameras mounted under clamshell doors on the top of the X-15, are equipped with ultraviolet filters. The spectrograph will measure the ultraviolet spectrum to determine what wave lengths the filters should be on future flights.

MORE

As the X-15 passes through 190,000 feet, McKay will position the X-15 so that the cameras are focused on the desired star. If the X-15 launch time is on schedule, McKay will roll the X-15 35 degrees right wing down and pitch the nose up 5 degrees.

If the launch time is delayed, these camera positioning movements will have to be altered to compensate for the earth's rotation. As the launch is delayed, the amount of roll will be increased and the amount of nose up pitch will be decreased.

The star tracking maneuver will last about 57 seconds. Pictures obtained are actually energy emissions of the stars that are used to verify theoretical data on the physical composition of the stars.

Reentry from the planned peak altitude of 200,000 feet should not result in temperatures in excess of 800° F. The rocket engine is slated to burn for 82 seconds which should result in a maximum velocity of 3500 m.p.h.

The X-15 will be launch from Delamar Lake, Nevada. The 250-mile trip should take about 10 minutes.

END

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FACT SHEET

FLIGHT:	139 (40 for X-15 number 2)
PILOT:	John B. McKay, NASA
NASA 1:	Major Robert Rushworth, USAF
B-52 TAKE OFF:	9:30 July 1, 1965
X-15 LAUNCH:	10:30 July 1, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 200,000 feet
PROGRAMMED ENGINE BURN TIME:	82 seconds
PROGRAMMED ENGINE THRUST:	59,250 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

X FRC

X-15 TO RECORD TURBULENT AIR NOISE

Major Robert A. Rushworth is scheduled to fly the number three X-15 on July 13 on the 140th flight in the joint NASA-USAF X-15 research program.

The purpose of the flight will be to acquire noise recordings of the boundary layer of air that flows between the X-15 and the free stream of air.

Five special recording microphones have been installed on the X-15; two on the right forward side of the fuselage, two on the left rear side of the fuselage, and one on the right side on the top vertical tail.

Data from these recordings, coupled with measurements obtained from strain guages mounted on the aircraft, are used for the prediction

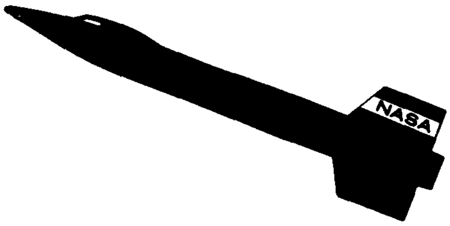
MORE

of possible structural fatigue of the metal. This data, the only high speed data available outside of wind tunnel work, will be used in the design of the planned supersonic transport.

NASA engineers predict that the noise levels recorded will be in the 140 - 150 decibel range, about as loud as sounding an automobile horn next to a human ear.

The flight will be air launched from a B-52 near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 80 seconds which should propel the X-15 to a planned maximum velocity of 3800 m.p.h. Peak altitude will be about 92,000 feet. The 250-mile flight should take about 11 minutes.

END



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FACT SHEET

FLIGHT:	140 (45 for X-15 number 3)
PILOT:	Major Robert A. Rushworth, USAF
NASA 1:	John B. McKay, NASA
B-52 TAKE OFF:	9:00 July 13, 1965
X-15 LAUNCH:	10:00 July 13, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3800 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 92,000 feet
PROGRAMMED ENGINE BURN TIME:	80 seconds
PROGRAMMED ENGINE THRUST:	58,750 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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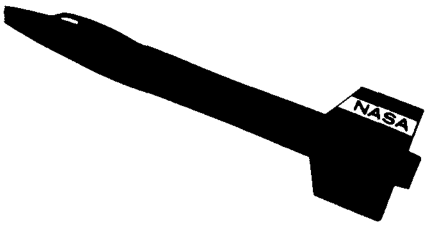
RUSHWORTH SCHEDULED FOR 104,000 FOOT X-15 FLIGHT

Lt. Colonel Robert A. Rushworth is scheduled to fly the number one X-15 on September 17 on the 149th flight in the joint NASA-USAF X-15 research program. The purpose of the flight is to carry an infrared scanner.

The scanner is a radiometer that is used to measure and record the infrared radiation that is transmitted from earth. In addition, the radiometer measures reflected solar radiation.

The X-15 will be air launched from a B-52 near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 80 seconds which should propel the aircraft to a maximum speed of approximately 3500 m.p.h. and a peak altitude of about 104,000 feet. The 250-mile flight should take about 11 minutes.

END



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FACT SHEET

FLIGHT:	149 (59 for X-15 number 1)
PILOT:	Lt. Col. Robert Rushworth, USAF
NASA 1:	Capt. Knight, USAF
B-52 TAKE-OFF:	9:00 September 17, 1965
X-15 LAUNCH:	10:00 September 17, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	104,000 feet
PROGRAMMED ENGINE BURN TIME:	80 seconds
PROGRAMMED ENGINE THRUST:	57,250 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE
August 12, 1965
17-65

FOR RELEASE: August 16, 1965
Released Simultaneously
with NASA Headquarters
Washington D. C.

X-15 TECHNICAL CONFERENCE TO BE HELD OCTOBER 7

Technical results obtained from the X-15 research program during the past four years will be presented at the fourth X-15 Conference on October 7. The conference is being sponsored by the Research Airplane Committee which is comprised of representatives of the National Aeronautics and Space Administration, the US Air Force, and the US Navy.

Since the last X-15 Conference, which was held in November 1961, the three X-15 aircraft will have made an additional 100 flights.

MORE

During this time the rocket powered aircraft has increased its maximum flight altitude from 217,000 feet to 354,200 feet.

On October 8, following the X-15 Conference, NASA's Flight Research Center will present a special technical review of other projects, including the Lunar Landing Research Vehicle, the Lifting Body program, and the research results obtained from the Air Force - NASA XB-70 flight program. Conditions permitting, flight tests of the vehicles will be made.

Items to be covered at the X-15 Conference include current status and future plans of the program, development of the X-15A-2 aircraft and thermal protection system, discussions of heat-transfer, controllability, and reentry research, a summary of scientific test bed experiments, hypersonic propulsion system testing, and others.

Over 600 representatives from industry and government have been invited to attend. Both technical sessions of the two-day meeting are classified.

Suggested listing:

Oct. 7-8 Fourth X-15 Technical Conference and Special Projects Review, NASA Flight Research Center, Edwards Air Force Base, California

END

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X-15 TO FINISH FIRST SERIES OF HORIZON SCANNING FLIGHTS

NASA research pilot Milton Thompson is scheduled to fly the number one X-15 on August 12 on the 144th flight in the joint NASA-USAF X-15 research program. This will be the final flight in the first series of X-15 flights carrying a horizon scanner in support of Project Apollo.

The horizon scanner experiment is being conducted for the Massachusetts Institute of Technology's Instrumentation Laboratory and is being used to verify theoretical data for use in establishing one of the navigational criteria for the miscourse maneuver of the Appolo spacecraft.

MORE

The first series of X-15 flights carry the scanner, a camera and two photometers, mounted in a fixed position. The following series of flights will carry the scanner mounted on an optically-stabilized platform.

The scanner surveys the earth's horizon and records measurements in the almost visible spectrum. These measurements, which will be recorded in all of the seasons of the year, will be used as one of the navigational reference points in determining the exact position of the spacecraft while in outer space.

The X-15 will be air launched from a B-52 near Delamar Lake, Nevada. The rocket engine is slated to burn for 81 seconds which should propel the aircraft to a top speed of about 3500 m.p.h. and a peak altitude of approximately 222,000 feet. The 250 mile trip should take about 10 minutes.

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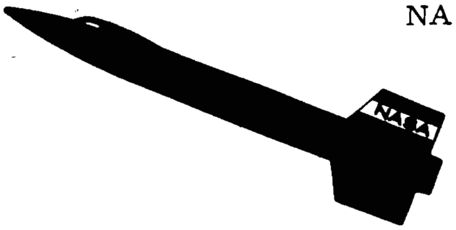

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FACT SHEET

FLIGHT:	144 (57 for X-15 number 1)
PILOT:	Milton O. Thompson, NASA
NASA 1:	Captain Joe Engle, USAF
B-52 TAKE-OFF:	9:00 August 12, 1965
X-15 LAUNCH:	10:00 August 12, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 222,000 feet
PROGRAMMED ENGINE BURN TIME:	81 seconds
PROGRAMMED ENGINE THRUST:	57,250 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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RUSHWORTH SCHEDULED FOR 240,000 X-15 FLIGHT

Major Robert Rushworth is scheduled to fly the number three X-15 on August 26 on the 145th flight in the joint NASA-USAF X-15 research program. The flight will obtain boundary layer noise measurements and carry an earth scanning device.

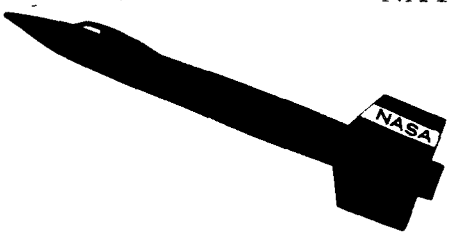
The earth scanner is a narrow band ultraviolet spectrometer that is used to measure near visual earth background and reflected solar intensity. It is mounted on the rear of the aircraft and faces to the side. Rushworth will perform small roll maneuvers in order to scan the earth's horizon.

MORE

The noise measurements will be recorded on five special microphones that are installed on the X-15. These measurements will record the noise intensity of the boundary layer of air that flows next to the surface of the X-15 and are used in the computation of predicted metal fatigue.

The X-15 will be air launched from a B-52 near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 79 seconds which should propel the aircraft to a maximum speed of approximately 3400 m.p.h. and a peak altitude of 240,000 feet. Maximum heating during reentry should not exceed $850^{o}F$. The 250 mile trip should take about 11 minutes.

END



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	145 (47 for X-15 number 3)
PILOT:	Major Robert Rushworth, USAF
NASA 1:	Captain Joe Engle, USAF
B-52 TAKE-OFF:	9:00 August 26, 1965
X-15 LAUNCH:	10:00 August 26, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3400 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 240,000 feet
PROGRAMMED ENGINE BURN TIME:	79 seconds
PROGRAMMED ENGINE THRUST:	57,250 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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X-15 SLATED FOR 266,000 FOOT FLIGHT

Captain Joe H. Engle is scheduled to fly the number three X-15 on August 5 on the 142nd flight in the joint NASA-USAF research program.

The flight, which is planned to reach a peak altitude of 266,000 feet will obtain boundary layer noise measurements, carry an earth scanning device, and utilize a slightly different reentry technique.

The noise measurements will be recorded on four special microphones and will be used in a study of predicted structural metal fatigue for use in the design of planned supersonic transport.

The earth scanner is a narrow band ultraviolet spectrometer that will measure near visual earth background and reflected solar intensity.

MORE

At peak altitude and in preparation for reentry, Captain Engle will establish a negative 'Theta' (the angle between the X-15's flight path and the earth's horizon) angle. This technique, first used by NASA X-15 pilot Joe Walker, allows the pilot easier control maneuvers during the reentry from steeper X-15 flights.

The flight will be air launched near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 81 seconds which should propel the aircraft to a maximum speed of approximately 3500 m.p.h. Reentry from the planned altitude of 266,000 feet will induce a maximum 'g' of about five. Temperatures should not exceed 800° F. The 250-mile flight should take about 12 minutes.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	142 (46 for X-15 number 3)
PILOT:	Captain Joe E. Engle, USAF
NASA 1:	Major Robert A. Rushworth, USAF
B-52 TAKE OFF:	12:45 August 5, 1965
X-15 LAUNCH:	1:45 August 5, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 266,000 feet
PROGRAMMED ENGINE BURN TIME:	81 seconds
PROGRAMMED ENGINE THRUST:	59,000 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

MCKAY TO PILOT X-15 49 MILES HIGH ON 150TH X-15 FLIGHT

NASA research pilot John McKay is scheduled to fly the number three X-15 on September 28 on the 150th flight in the joint NASA-USAF X-15 research program. The flight will obtain boundary layer noise measurements and carry an earth scanning device.

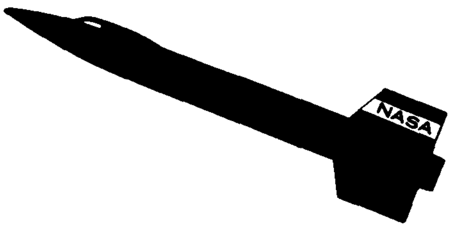
The earth scanner is a narrow band ultraviolet spectrometer that is used to measure near visual earth background and reflected solar intensity. It is mounted on the rear of the aircraft and faces to the side. McKay will perform small roll maneuvers in order to scan the earth's horizon.

MORE

The noise measurements will be recorded on five special microphones that are installed on the X-15. These measurements will record the noise intensity of the boundary layer of air that flows next to the surface of the X-15 and are used in the computation of predicted metal fatigue.

The X-15 will be air-launched from a B-52 near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 82 seconds which should propel the aircraft to a maximum speed of approximately 3500 m.p.h. and a peak altitude of 260,000 feet. Maximum heating during reentry should not exceed 825°F. The 250-mile trip should take about 11 minutes.

END



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	150 (49 for X-15 number 3)
PILOT:	John B. McKay, NASA
NASA 1:	William Dana, NASA
B-52 TAKE-OFF:	10:30 September 28, 1965
X-15 LAUNCH:	11:30 September 28, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 260,000 feet
PROGRAMMED ENGINE BURN TIME:	82 seconds
PROGRAMMED ENGINE THRUST:	58,750 lbs
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

X-15 TO CARRY HORIZON SCANNER

Captain Joe Engle is scheduled to fly the number one X-15 on October 8 on the 152nd flight in the joint NASA-USAF X-15 research program. The flight will carry a slightly modified horizon scanner and a device for measuring microscopic atmospheric pressure.

The horizon scanner will be used to survey the earth's horizon in the almost visible spectrum. These measurements, which will be recorded in all seasons of the year, will be used as one of the naviga-tional reference points for the mid-course maneuver of the Apollo spacecraft.

MORE

Previous X-15 earth scanning flights used a scanner (a camera and two photometers) mounted in a fixed position. Today's flight will carry a scanner that is measuring in different wave lengths.

The X-15 will be air-launched from a B-52 near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 83 seconds which should propel the X-15 to a peak altitude of 250,000 feet and a maximum speed of 3500 mph. The 250-mile flight will last about 10 minutes.

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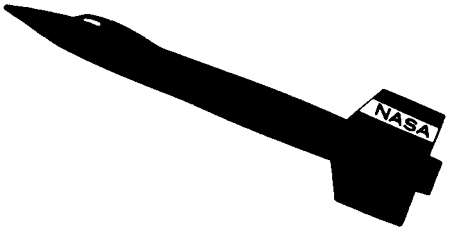


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	152 (~~60~~ 61 for X-15 number 1)
PILOT:	Captain Joe Engle, USAF
NASA 1:	Lt. Col. Robert Rushworth, USAF
B-52 TAKE-OFF:	9:00 October 8, 1965
X-15 LAUNCH:	10:00 October 8, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 250,000 feet
PROGRAMMED ENGINE BURN TIME:	83 seconds
PROGRAMMED ENGINE THRUST:	57,250 lbs.
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 19-65
September 28, 1965

FOR RELEASE: IMMEDIATELY

KNIGHT TO MAKE FIRST X-15 FLIGHT

The first of two pilots selected last spring to fly the X-15 is scheduled to make his first flight in the rocket-powered aircraft no earlier than September 30. Air Force Captain William (Pete) J. Knight will pilot the craft in the 151st flight in the joint NASA-USAF X-15 research program.

The other new X-15 pilot, NASA research pilot William Dana, is expected to make his first X-15 flight within a short time.

Captain Knight, Mansfield, Ohio, was selected as one of the original pilots for the since cancelled X-20 DynaSoar. He is presently assigned to the Air Force Flight Test Center at Edwards.

MORE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

CAPT. KNIGHT SCHEDULED TO MAKE SECOND X-15 FLIGHT

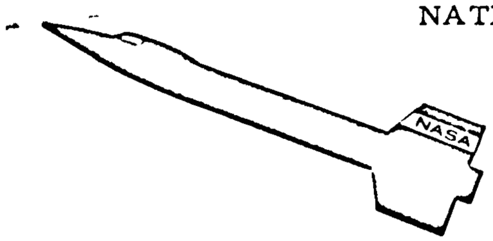
Captain William J. Knight is scheduled to make his second flight in the rocket-powered X-15 on October 12. This will be the 153rd flight in the joint NASA-USAF X-15 research program.

The X-15 is scheduled to be air-launched from a B-52 near Hidden Hills, a dry lakebed on the California-Nevada state line. After launch, Knight will reduce his throttle setting to approximately 75% power and let the rocket engine burn for 88 seconds. This should propel him to a maximum speed of about 3100 miles per hour and a peak altitude of approximately 94,000 feet.

After descending from peak altitude, Knight will perform several small turns to better familiarize himself with the aircraft.

Knight made his first X-15 flight on September 30.

END



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	153 (50 for X-15 number 3)
PILOT:	Capt. William Knight, USAF
NASA 1:	Lt. Col. R. Rushworth, USAF
B-52 TAKE-OFF:	9:00 October 12, 1965
X-15 LAUNCH:	10:00 October 12, 1965
LAUNCH AREA:	Hidden Hills, Calif. -Nevada
FLIGHT DISTANCE:	125 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3100 mph
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 94,000 feet
PROGRAMMED ENGINE BURN TIME:	88 seconds
PROGRAMMED ENGINE THRUST:	47,000 lbs. (at 75%)
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 20-65 FOR RELEASE: October 7, 1965

October 4, 1965

X-15 TECHNICAL CONFERENCE HELD TODAY

Almost 700 engineers and scientists from throughout the country gathered here today at the National Aeronautics and Space Administration's Flight Research Center to listen to a technical review of the results of the X-15 flight research program.

Thirteen reports which described the results of basic aerodynamic research, some of the scientific space-orientated experiments being carried on the aircraft, and the evaluation of man's ability to control extreme performance vehicles were presented.

A special report which briefly described X-15 programs under consideration for possible future use was delivered by two high X-15 project officials,

MORE

Paul F. Bikle and John S. McCollum. Bikle, Director of NASA's Flight Research Center, is responsible for the technical direction of the X-15 program, and McCollum is the Director of New Programs and Research Projects, Air Force Aeronautical Systems Division.

The report referred to the feasibility of flight testing hypersonic ramjets on the X-15 and the possibility of modifying one of the X-15's to a severely swept delta-winged aircraft. Both of these programs are under study for possible use in a flight research program to obtain in-flight data on delta-winged aircraft in hypersonic (above five times the speed of sound) flight.

This was the fourth X-15 Technical Conference to have been held since the X-15 program was begun in 1954. Since the last conference, held in 1961, the three X-15 aircraft have made more than an additional 100 flights, and have increased their flight performance to a maximum speed of 4104 miles per hour and a peak altitude of 354,200 feet (67 miles).

The conference was attended by representatives of government, industry, air-lines, education, and private research institutions. Tomorrow, NASA's Flight Research Center will present technical briefings on three other NASA programs, the Lunar Landing Research Vehicle, the Lifting Body Research Program, and the supersonic transport research being conducted on the XB-70.

END

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

MCKAY SCHEDULED FOR 49-MILE HIGH X-15 FLIGHT

National Aeronautics and Space Administration research pilot John McKay is scheduled to fly the number three X-15 on October 27 on the 155th flight in the joint NASA-USAF X-15 research program. The flight will obtain boundary layer noise measurements and carry an earth horizon scanning device.

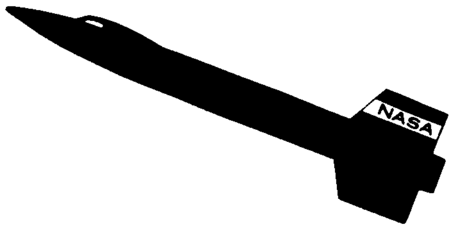
The noise measurements will be recorded on five special microphones that are installed on the X-15. These measurements will record the noise intensity of the boundary layer of air that flows next to the surface of the X-15. This data is used in the computation of predicted metal fatigue on advanced vehicles.

MORE

The horizon scanner was developed by NASA's Langley Research Center, Hampton, Virginia. It is mounted on the rear of the aircraft and is used to closely define the earth's horizon. This information is used to establish the navigational criteria on future space flights.

The X-15 will be air-launched from a B-52 aircraft near Delamar Lake, Nevada. The rocket engine is scheduled to burn for 82 seconds which should propel the aircraft to a maximum speed of 3500 miles per hour and a peak altitude of approximately 260,000 feet. Maximum heating during reentry should not exceed 825°F. The 250-mile trip should take about 11 minutes.

END



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
Edwards, California

FACT SHEET

FLIGHT:	155 (51 for X-15 number 3)
PILOT:	John B. McKay, NASA
NASA 1:	Capt. William Knight, USAF
B-52 TAKE-OFF:	9:00 October 27, 1965
X-15 LAUNCH:	10:00 October 27, 1965
LAUNCH AREA:	Delamar Lake, Nevada
FLIGHT DISTANCE:	250 miles
PROGRAMMED MAXIMUM SPEED:	Approximately 3500 m.p.h.
PROGRAMMED MAXIMUM ALTITUDE:	Approximately 260,000 feet
PROGRAMMED ENGINE BURN TIME:	82 seconds
PROGRAMMED ENGINE THRUST:	57,750 lbs
SUPPORT PERSONNEL:	
B-52 PILOT	Unassigned
LAUNCH PANEL	Unassigned
CHASE PILOTS	Unassigned
PRIME CONTRACTOR (Air Frame):	North American Aviation, Inc.
PRIME CONTRACTOR (Power Plant):	Thiokol Chemical Corporation

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 22-65
October 20, 1965

FOR RELEASE: October 25, 1965
Released Simultaneously
with NASA Headquarters
Washington, D. C.

NASA SCHEDULES FIRST FLIGHT OF X-15 WITH EXTERNAL PROPELLANT TANKS

The National Aeronautics and Space Administration has tentatively scheduled the first flight of the number two X-15 with its external propellant tanks for October 27. This will be the first of two flights that will test the in-flight tank ejection procedure and the tank recovery systems.

The external tanks will carry added propellant on future flights that may increase the X-15's speed to greater than 5,000 miles per hour.

This will be the initial time that the X-15 #2 has flown with the two 25-foot long tanks attached to the underside of the aircraft's fuselage. For this flight, the tanks will be empty and weigh about 1800 pounds.

MORE

On later research flights, approximately 13,500 lbs. of propellant (anhydrous ammonia and liquid oxygen) will be carried in the tanks.

The X-15, with Lt. Col. Robert A. Rushworth, USAF, as the pilot, will be air-launched from a B-52 near Cuddeback, a dry lakebed 50 miles north of here. After launch, Rushworth will throttle back to a minimum power setting. As he reaches a speed of approximately 1400 m.p.h. and an altitude of 69,000 feet, he will activate the tank jettison switch. These are approximately the same flight conditions at which tank separation will occur on future X-15 research missions.

After separation from the X-15, each of the two tanks will deploy a 34 foot parachute for descent to a bombing range area. The tanks will be refurbished for re-use.

Because of the short flight, the X-15 will hold its maximum speed down to 1500 m.p.h. and should not exceed 70,000 feet. The jettisonable portion of the lower vertical tail will also be carried on this flight to increase aircraft stability.

Following an accident in 1962, the number two X-15 was repaired and modified. Part of these modifications included the capability to carry these two external propellant tanks. The added propellant is expected to increase the burning time of the X-15's rocket engine from 85 to 145 seconds which may increase the X-15's speed up to eight times the speed of sound or slightly over 5000 m.p.h. Present maximum speed of the X-15 is 4104 m.p.h.

This will be the 12th flight of the number two X-15 following its repairs and the first with tanks attached.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 23-65 **FOR RELEASE:** IMMEDIATELY
October 29, 1965

DANA TO MAKE FIRST X-15 FLIGHT

William H. Dana, a civilian pilot-engineer for the National Aeronautics and Space Administration's Flight Research Center, is tentatively scheduled to make his first flight in the rocket-powered X-15 on November 2. 4

He is the second of two new X-15 pilots selected earlier this year. Air Force Captain William J. Knight made his first flight several weeks ago.

Dana's flight plan calls for him to be air-launched from a B-52

MORE

aircraft near Hidden Hills, California, a dry lakebed on the California-Nevada state line. After launch, he will reduce power to 50 percent and climb to approximately 74,000 feet. After reaching a planned speed of about 2700 miles per hour, he will perform several control maneuvers designed to familiarize him with the X-15 in flight. The 125-mile flight should last about nine minutes.

Dana, a native of Bakersfield, California is a graduate of the U.S. Military Academy at West Point. After serving as a jet pilot in the Air Force, he earned his M.S. in aeronautical engineering from the University of Southern California in 1958.

Prior to being assigned to the X-15 program, Dana was associated with several research programs for NASA. He has piloted the lightweight M-2 lifting body.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 24-65
November 17, 1965

FOR RELEASE: November 22, 1965

NASA RECEIVES FLYING LABORATORY

The National Aeronautics and Space Administration's Flight Research Center, Edwards, California has received a flying laboratory that will be used to provide airborne simulation of advanced aircraft with particular emphasis on the proposed supersonic transport.

Called the General Purpose Airborne Simulator (GPAS), the new system will allow NASA engineers and pilots to evaluate specific future aircraft designs in a wide variety of actual flight conditions. Airborne simulation is more desirable than ground simulation because the pilot is provided with motion and visual cues from actual flight.

A Lockheed JetStar, capable of flight at speeds in excess of

MORE

550 miles per hour and at altitudes up to 40,000 feet, has been modified by the Cornell Aeronautical Laboratory, Buffalo, New York with an improved variable stability control system, an airborne analog computer, and a data acquisition system. Cornell performed the modifications under a 1.3 million dollar contract with NASA.

The system utilizes a new variable stability technique called "model control." Under this technique, the equations of motion of the simulated aircraft are programmed on the analog computer. The computer then, after receiving flight control inputs from the JetStar test pilot, sends commands to the JetStar controls which make the JetStar fly like the simulated aircraft.

GPAS can simulate pitch, yaw, roll and forward velocity movement. In addition to duplicating the motion of the aircraft under simulation, the system gives the pilot the actual feel of the simulated aircraft's controls. This allows the simulation of several different control configurations on the same simulated aircraft.

The GPAS will normally carry a test pilot, safety pilot, flight test engineer and two flight test observers.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif.
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 20-67 FOR RELEASE: IMMEDIATE

July 31, 1967

MEMO TO EDITORS:

Following is a summary of the findings of the investigating board appointed to examine and report on the May 10, 1967, landing accident involving the M2-F2 lifting body research vehicle at Edwards, Calif.

M2-F2 LIFTING BODY ACCIDENT SUMMARY

On May 10, 1967, the experimental M2-F2 lifting body vehicle crashed in landing on Rogers Dry Lake at the NASA Flight Research Center, Edwards,

MORE

California. The vehicle was piloted by Bruce A. Peterson, NASA research pilot and engineer. The M2-F2 was extensively damaged and Peterson sustained severe facial injuries.

An eight-man investigating board was appointed to determine factors leading to the accident, analyze the results, and make recommendations to minimize the possibility of similar occurrences in future flights.

The M2-F2 vehicle is one of the configurations used in a flight research program to investigate the problems and potentialities of piloted spacecraft that in the future may re-enter the atmosphere and be maneuvered to ground landings. The program to date has concentrated on subsonic glide and landings.

The May 10 flight was the 16th for the M2-F2. The research vehicle was released into unpowered flight from beneath the wing of the B-52 airplane at an altitude of about 45,000 feet. The flight path was a standard U-shaped pattern with three legs on two left turns. Planned research maneuvers were conducted on the first two legs. The third leg was the landing approach. Prior to air drop, the pilot announced his intention to change the heading of the landing approach path to angle across the runway to reduce crosswind effects. This called for the pilot to make a slight S-turn (left, then right) on the approach leg, prior to landing, which is common practice.

The flight was normal through the second left turn into the approach leg. In coming out of this turn, leveling from a banked condition, a lateral oscillation (rolling from side to side) developed and quickly increased in amplitude.

MORE

Using established technique procedures, the pilot was able to correct the roll condition and regain control of the vehicle in 11 seconds.

By the time of recovery from the violent oscillation, the M2-F2's approach heading was to the left and angled from the runway markings on the lake bed. The pilot found it necessary to immediately begin the landing flare without further heading changes.

The heading to which the pilot was committed left him without the runway-type markings normally used for both landing direction and visual height cues and placed the vehicle on a flight path that caused him to be disturbed by the possibility of collision with the rescue helicopter hovering left of the runway markings.

Additionally, the violent roll motion had forced the chase plane pilots to swerve a safe distance away and placed them out of position to provide the normal altitude callouts via radio to the M2-F2 pilot.

The M2-F2 completed its landing flare and contacted the ground just as the descent (vertical) velocity was arrested and before the landing gear was extended. After bouncing, sliding, and rolling over several times the vehicle came to rest upside down. Landing occurred without the M2-F2 impacting the retreating helicopter, which was several hundred feet away laterally.

The investigating board found that the immediate cause of the accident was an unusually low landing flare maneuver and premature ground contact. The board concludes that this was the result of an unusual set of circumstances that individually would not have ended in an accident. The major circumstances most pertinent as contributing factors were:

MORE

A. The pilot was overburdened in his normally exacting task by a combination of events that disoriented and distracted him and denied him normal height information.

B. The large amplitude roll oscillation during final approach that caused a temporary loss of lateral control of the research vehicle and changed the landing heading.

C. Potential collision with the rescue helicopter hovering near the path of the imposed landing heading.

D. Lack of visual height cues in landing area to which the pilot was committed.

E. Unavoidable absence of radioed altitude callouts from chase aircraft.

The major pertinent recommendations of the board include:

(1) Ways should be sought to ease pilot workloads in landing lifting-body-type vehicles. Consideration shouldbe given to increasing the time allotted to the pilot for the landing phase and to improving the lateral-directional handling qualities to which the pilot is exposed during the landing phase.

(2) During the landings of unconventional aircraft, the lake bed should be kept clear, not only in the immediate, planned landing area, but also in a much larger area in which an inadvertent landing might take place.

(3) Research flight planning, briefing, and monitoring procedures

should be reviewed with the intent of improving the flow of information and insuring that all participants are kept adequately informed.

END

F.R.
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NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif. 93523
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 22-67

September 18, 1967

FOR RELEASE:
September 20, 1967

12 Oct
4/C
Re: Miss Medley phoned Jim Martin, NASA, — was given reasons why X-15 didn't fly on 25th Sep. — RAIN.
Thibault

NASA SCHEDULES HIGH-SPEED X-15 FLIGHT

The National Aeronautics and Space Administration has rescheduled the high-speed flight of the number two X-15 for September 25. The flight plan calls for Air Force Major William J. Knight to pilot the rocket-powered aircraft to a speed of six-and-one-half times the speed of sound, approximately 4,500 mph.

If the planned speed is attained, it will establish a new unofficial world speed record for manned aircraft.

Because of increased air friction at the higher speeds, the X-15 will be exposed to higher temperatures, approximately 1500° F. To protect the aircraft, the X-15 has been coated with a thermal protection material that disipates heat by reflection, insulation, and charring itself.

MORE

The thermal protection material, a sprayable, silicone-based ablator, and pinkish-brown in color, is covered with a white paint that acts as a sealer.

To attain the higher speed, the X-15 will carry two 23-ft. external tanks with an additional 13,500 lbs. of engine propellant. This propellant will be used to supplement the basic propellant inside of the X-15. The added propellant will increase the burn time of the X-15's rocket engine to 144 seconds. The use of speed brakes and dynamic pressure will hold the speed down to 4,500 mph on this flight. Future X-15 flights with the external tanks will gradually increase the speed up to 5,000 mph.

Engine propellant, anhydrous ammonia and liquid oxygen, is fed from the external tanks first. The empty tanks are then jettisoned for recovery and re-use.

A mechanical eyelid has been installed on the pilot's left windshield. This eyelid is covered with ablator and kept closed during the high speed portion of the flight to protect the windshield from the heating and ablator residue effects. The eyelid is opened just prior to beginning the landing approach.

A dummy, non-flowing ramjet will be carried on the lower vertical tail of the X-15 on this flight. Instrumentation will measure the flow field of the air around the engine, and X-15 performance with the engine attached, and the drag caused by the engine.

The increased speed capability of the X-15 eventually will be used to flight-test a working ramjet that is presently under development for NASA by the Garrett Corp., Los Angeles. The higher speeds are required to provide supersonic

MORE

airflow into the combustion chambers of the ramjet. Present ramjet testing is limited to wind tunnels and sounding rockets.

The outboard one-third section of the right wing of the number two X-15 is removeable. As new materials and construction techniques become available, new wing sections will be installed for flight testing at the higher speeds.

The previous flight of the number two X-15 was made with the ablative coating on the aircraft. Minor refurbishment was performed for the upcoming flight.

This will be the 189th flight in the joint NASA/USAF X-15 research program. The ablator-thermal protection system was developed by the Martin-Marietta Corp. The X-15 airframe was built by North American Aviation and the YLR-99 rocket engine by the Thiokol Chemical Corp.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif. 93523
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 5-68 FOR RELEASE: IMMEDIATE

February 19, 1968

X-24 TO BEGIN FULL-SCALE WIND TUNNEL TEST

The X-24 manned lifting body has been sent to NASA's Ames Research Center near San Francisco, Calif., for full-scale wind tunnel tests in the Ames 40' x 80' wind tunnel. Tests will begin February 26 and take about two weeks.

Prime purpose of the tests is to verify the aerodynamic predictions for the X-24 that were obtained from earlier small-scale model tests.

Prior to shipping, engineers at NASA's Flight Research Center coated the X-24 with a mixture of finely grained sand and wall paper paste. The resulting rough surface simulates the remaining charred portion of an ablative coating that would have been used for thermal protection during reentry from space flight. The first series of wind tunnel tests will measure the increased drag caused by the simulated charred ablative material. The

- MORE -

mixture will then be washed off for the remainder of the wind tunnel tests.

The X-24 flight research vehicle will not encounter sufficient heating during its test flights to require ablative protection. However, if an X-24 lifting body configuration were ever used for space flights, it would probably require ablative material for thermal protection.

The X-24 lifting body was built for the U. S. Air Force by the Martin Marietta Company. It will be flight tested as part of a joint NASA-USAF effort.

- END -

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif. 93523
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 6-68
March 11, 1968

FOR RELEASE: Thursday
March 14, 1968 A.M.

NEW LEGAL COUNSEL AT NASA

Mr. E. J. (Jack) Spielman has been appointed Chief Counsel at NASA's Flight Research Center at Edwards. Mr. Spielman will be responsible for providing legal advice and guidance in the field of business, procurement, and public law to the local NASA facility.

With over 22 years of government service in significant legal positions, he has practiced law in California, New York, the District of Columbia, and before the Supreme Court of the United States. He is a graduate of the New York Law School and, at one time, was the Chief Legal Officer for the Manhattan District of the Atomic Energy Project.

Mr. Spielman is Chairman of the Los Angeles Federal Attorneys Council, past-President of the Aerospace Chapter of the Federal Bar Association, and guest lecturer at Loyola Law School in Los Angeles.

-END-

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif. 93523
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 7-68
March 21, 1968

FOR RELEASE:
IMMEDIATE

NATIONAL AIAA MEETING FEATURES LOCAL NASA EFFORTS

Research programs at NASA's Flight Research Center will be described at the national AIAA meeting being held in Los Angeles this week. The meeting will be the American Institute of Aeronautics and Astronautics 2nd Flight Test, Simulation, and Support Conference.

Joe Weil, Chief of Research at the local NASA facility, will be chairman for one of the technical sessions.

Papers presented by Dale Reed, Milt Thompson, and Major Gerry Gentry will describe different phases of the manned lifting body flight test program now in progress as well as some of the advanced research being conducted.

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NEWS RELEASE ✓

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Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 9-68
March 19, 1968

FOR RELEASE: MONDAY P. M.
March 25, 1968

NASA USES MODEL AIRPLANE TECHNIQUES FOR SPACECRAFT RECOVERY SYSTEMS EVALUATION

Engineers at NASA's Flight Research Center, Edwards, Calif., are using small, radio-controlled model spacecraft to evaluate concepts for possible advanced spacecraft recovery systems. The National Aeronautics and Space Administration has already made over 100 successful flights of the model spacecraft during the low cost program.

A status report was delivered today by Robert D. Reed, head of advanced planning for reentry vehicles at NASA's Flight Research Center to the American Institute of Aeronautics and Astronautics 2nd Flight Test, Simulation and Support Conference, Los Angeles.

Small scale models of lifting body type spacecraft, both heavy volume (M-2) and slender body style, are equipped with standard radio control

- MORE -

equipment used by model airplane builders. They are being flight tested with various advanced flexible wing and gliding parachute type recovery systems to determine their suitability for ground landings. Future tests will evaluate capsule-type spacecraft with gliding parachutes for ground landing.

To expediate the studies on a minimum effort basis, the scale model approach was utilized using readily available, low cost equipment. Future tests may use man-sized vehicles with helicopters as the launch vehicles.

The scale spacecraft models, about 40 inches long, are carried beneath a model airplane, also equipped with radio controls, to a launch altitude of 1000 feet. Upon ground command, the model spacecraft are released for free flight.

As the model spacecraft is released, a particular type of gliding parachute or parawing is deployed. Radio equipment inside of the model spacecraft is used to control the parawing for maneuvering to a horizontal ground landing.

Another experiment was made to evaluate the effects of increased size and weight. A 230 pound sled was launched on three different occasions from a helicopter flying at 4000 feet. A 400 square-foot parawing was used for the subsequent glide and recovery phase of the tests. Control of the sled/parawing combination by use of the model airplane equipment was considered excellent.

Reed reported that based upon the results of current tests, it is possible to consistently maneuver the experimental model parawing combination to a precision landing within a 20 foot circle from launch altitudes of 1000 feet in favorable weather conditions. He also noted that in rough air, twisting of the parawing's suspension system can occur.

Reed stated that because of increased versatility of model airplane radio control techniques, he believed that many flight test organizations can gain useful preliminary flight experience with model flight studies at extreme low cost.

- END -

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER, Edwards, Calif. 93523
Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 19-68
July 1, 1968

FOR RELEASE: 12 Noon PDT
July 2, 1968
(also being released in
Washington, D. C.)

NASA EXTENDS XB-70 CONTRACTS

The National Aeronautics and Space Administration extended its XB-70 contracts with North American Rockwell, El Segundo, Calif., and General Electric Co., Evendale, Ohio, for maintenance and support of the XB-70. The extensions cover the period of July 1 through June 30, 1969.

North American Rockwell, builder of the XB-70, will receive 6,968, 038 dollars for material, facilities, manpower and equipment for flight operations. General Electric will get 1, 957, 323 dollars for maintenance of XB-70 jet engines.

The XB-70 is being flown by NASA's Flight Research Center, Edwards, Calif., in support of the national supersonic transport program. The huge aircraft has flown at speeds of 2000 mph and altitudes of 70, 000 feet.

END

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FRC NEWS RELEASE 20-68
July 17, 1968

FOR RELEASE:
IMMEDIATE
(also being released
in Washington, D.C.)

MEMO TO EDITORS:

Attached is a summary of the findings of the NASA Board appointed to investigate and report on the Nov. 15, 1967, accident of the X-15 No. 3 near Johannesburg, Calif., destroying the aircraft and killing the pilot, Maj. Michael J. Adams, USAF.

END

X-15 ACCIDENT REPORT

On November 15, 1967, the X-15 No. 3 research aircraft crashed near Johannesburg, Calif., destroying the aircraft and killing the pilot, Major Michael J. Adams, USAF.

The X-15 No. 3 was one of three rocket-powered aircraft being flown in a research flight program to obtain aerodynamic information at high speed, high altitude flight. The aircraft are also utilized as carriers of various non-aerodynamic scientific experiments requiring high altitude test conditions.

X-15 No. 3 had six-foot pods on the wing tips to carry experiments. It differed from the other two X-15 aircraft in that it had a Minneapolis-Honeywell-96 (MH-96) adaptive system as the primary control system. The MH-96 combined aerodynamic and reaction (thruster) controls in a single system.

This was the 191st flight in the X-15 program, the 65th flight of the X-15 No. 3, the seventh X-15 flight for the pilot, and his third in this airplane. The flight was planned to reach a maximum altitude of 250,000 feet and a maximum velocity of 5100 feet per second (approximately 3500 mph). The pilot's training for this flight included 23 hours in the

MORE

X-15 ground simulator and flight practice in an F-104 aircraft adapted for the X-15 program.

The rocket-powered climb portion of the flight was normal except for an aircraft electrical system disturbance attributed to probable arcing in the bow-shock experiment. The disturbance affected the quality of the information radioed to the ground, the altitude and velocity computer and cockpit displays of the inertial guidance system, and the automatic operations of the primary control system. Although this did create a distraction to the pilot and degraded the automatic feature of the reaction control system, the pilot possessed adequate flight instruments and control capabilities for the conduct of the flight.

As the X-15 approached peak altitude, the aircraft began a slow change in heading (flat turn) to the right at a rate of 0.5 degrees per second. Because this portion of the flight was outside most of the atmosphere and the plane was, in effect, coasting along a pre-determined flight profile, only the heading (direction the plane was headed) and not the flight path was changed.

The automatic part of the reaction control system operated normally for short periods and near peak altitude stopped this heading (sideslip) change. This intermittent operation possibly misled the pilot.

MORE

At peak altitude, 266,400 feet (50.4 miles), the X-15's heading was 15 degrees right of flight path.

Possibley suffering from some sort of disorientation the pilot apparently mistaking a roll indicator for a sideslip (heading) indicator, used manual reaction control to drive the aircraft farther to the right in heading.

This indicator could be selected by the pilot to indicate either sideslip or roll. Cockpit films show the needle was indicating roll as was planned for this portion of the flight. Three other instruments in the cockpit were all correctly indicating the error in heading and sideslip.

About 30 seconds after descending from peak altitude and as the aerodynamic forces were becoming more intense because of more dense air, the X-15 heading error had been increased to 90 degrees right of flight path. The plane entered a spin at an altitude of approximately 230,000 feet and a speed of Mach 5, more than 3,000 miles an hour.

The aircraft continued to spin for some 43 seconds down to an altitude of about 120,000 feet where some combination of pilot action, the X-15's inherent stability an d the stability augmentation portion of the MH-96 control system caused the aircraft to recover from the spin. Its speed was about Mach 4.7. However, immediately following the spin

MORE

recovery, the X-15 developed a pitch oscillation (nose up and down). The automatic control system became saturated, causing the pitch damper gain to remain at maximum setting. Because of this high gain setting, the automatic control system caused the oscillation to become self-sustaining and increasing in severity.

Once the control system oscillation began, the only means of stopping the oscillation and recovering the aircraft was to reduce the amount of pitch gain to minimum or to turn the pitch damper off. Neither of these actions was taken prior to the loss of telemetry. The Board felt that it is doubtful whether recognition of the problem and actuation of the proper switches could have been accomplished under the heavy stresses and with the violent aircraft motions that were occurring.

At this time the aircraft was descending at approximately 160,000 feet per minute (2600 fps), and the dynamic pressure (or drag force) was increasing at nearly 100 pounds per square foot each second. There was a corresponding increase in acceleration (g) forces, with both positive and negative forces in excess of $\pm$ 15 g, which exceeded the structural limitations of the X-15. The airplane broke into many pieces while still at high altitude, probably in excess of 60,000 feet.

The pilot, probably incapacitated by the high g forces, did not escape from the cockpit.

The Board said the Government should formally report on its experience with the MH-96 system. The Board also recommended that NASA One, the X-15 ground control center, should receive readings of the airplane heading (directional attitude) by telemetry, and that a careful checkout be made of experiments and other equipment before the X-15 flies.

The physical examinations of pilots should include special tests for tendency toward vertigo, the Board said. It also called for extra means for the pilot to maintain the proper heading under ballistic flight conditions, and the vital instruments used by the pilot to determine his attitude and position in flight, not be changed from the usual functions.

END

NEWS RELEASE

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Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 28-68
December 10, 1968

FOR RELEASE: Monday
December 16, 1968

XB-70 FLIGHT EXPERIENCE PROVIDES SST INFORMATION

Actual flight experience gained through the XB-70 flight test program is providing valuable information for future large supersonic commercial and military aircraft according to two recent NASA reports. The two separate reports were delivered by engineers of the National Aeronautics and Space Administration, Dr. Eldon E. Kordes to the American Society of Mechanical Engineers; and Fitzhugh L. Fulton, Jr., to the Flight Safety Foundation.

Kordes is a Senior Staff Scientist and Fulton is Chief XB-70 Pilot for NASA's Flight Research Center, Edwards, Calif., which is managing the XB-70 Flight Research Program.

-MORE-

Although XB-70 noise can not be compared directly with SST data because of engine size and climb profile differences, the XB-70 data are being used to provide assessment of noise-prediction methods for SST-type aircraft based upon XB-70 experience.

Results from the XB-70's participation in the national sonic boom research program show that the present methods of predicting the overpressure and extent of the sonic disturbance are generally adequate for aircraft of this size and speed under "standard day" conditions. However, the tests with the XB-70 indicated that unusual weather conditions and other factors can seriously affect these predictions.

Only about seven per cent of the XB-70's flight above 40,000 feet altitude has encountered turbulence. However, regions of turbulence as large as 450 miles in length have been noted between the altitudes of 60,000 and 65,000 feet. The present XB-70 flight program is attempting to define not only the frequency of turbulence encounters and size of turbulent areas but also the intensity of the turbulence at the higher altitudes.

Although the response of the XB-70 to particular samples of high altitude turbulence may be different from the SST-type aircraft, the measured XB-70 response does point out the type of problems that will be encountered. A system to improve the aircraft's stability, lessen the turbulence-induced accelerations, improve the passenger riding qualities, and to lengthen the fatigue life of the airplane structure under turbulent conditions is presently being tested on the XB-70.

-MORE-

The need for accurate weather information along the route has been demonstrated by the XB-70. Flight results indicate that variations from predicted in-flight temperatures have made significant differences in fuel usage and speed, pointing out the need for using these data for SST flight planning.

New methods of presenting flight and engine information to the pilot have been successful in the operation of the XB-70. In addition to normal flight instruments, altitude and airspeed information is presented in a digital form for more precise readout. Special warning systems prevent exceeding the operating limits. An altitude indicator with a changeable sensitivity for easier reading and smoother flight control has been installed and evaluated also. This indicator permits the pilot to control small attitude changes which might otherwise result in large altitude changes.

Although the XB-70 has been flown safely with its automatic damping system intentionally turned off, it has demonstrated that there is a need for further research in the basic stability and control characteristics of this class of aircraft.

Actual cross country flight experience with the XB-70 has been attained with a trip from Edwards AFB, California, to Carswell AFB, Texas, and return. The trip was uneventful except that it did indicate the need for increased emphasis on proper flight planning and execution. Because of the speed and altitude involved, and the desire to minimize sonic boom disturbances, the letdown from the cruising altitude of 64,000 feet and 2.70 mach number was begun about 250 miles from the destination.

-MORE-

Both authors pointed out that although the XB-70 was not designed as a passenger-carrying aircraft, its physical size and performance characteristics are very similar to currently proposed supersonic aircraft. Unlike the development of the subsonic transports of a decade ago which could rely upon a wealth of in-flight data from various military aircraft, the XB-70 is the only aircraft that approaches the SST size and speed which is operational today.

-END-

NEWS RELEASE

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Telephone: 805 CLifford 8-3311 Ext: 221

FRC NEWS RELEASE 7-69

FOR RELEASE: Noon
February 27, 1969

NASA AWARDS SERV-AIR INC. SUPPORT CONTRACT

The National Aeronautics and Space Administration has selected Serv-Air Inc., Vance AFB, Enid, Okla., for award of a contract to perform Administrative Technical Support Services at Flight Research Center, Edwards, Calif. Nine firms had submitted proposals for this procurement.

The cost-plus-award-fee contract to be awarded is for one year, with provisions for two one-year extensions thereafter. The amount of the contract is estimated at $750,000.00 per year.

Serv-Air will perform inventory management for aircraft maintenance supply and for general supply. In addition, they will provide facilities maintenance and miscellaneous administrative services.

-END-

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FRC NEWS RELEASE: 7/70
April 27, 1970

FOR RELEASE:
IMMEDIATE

NASA TO RETIRE JET AIRCRAFT

An airplane used by Neil Armstrong to practice spacecraft emergency maneuvers will be turned over to the Ohio Historical Society by the National Aeronautics and Space Administration.

The high speed F5D "Skylancer" is being retired by NASA's Flight Research Center, Edwards, Calif., and will ultimately be displayed in the Armstrong Museum that will be constructed in Wapakoneta, Ohio, birthplace of the first man to step on the moon.

The F5D was flown by Armstrong in the early 1960's when he was attached as an X-15 pilot for NASA's Flight Research Center. Armstrong was selected as one of the project pilots for the since-cancelled X-20 Dyna Soar program.

Dyna Soar was an Air Force program that called for the launch of a winged vehicle into orbital flight with the capability of maneuvering to ground landings. It was cancelled in 1963.

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Armstrong devised a plan that used the F5D to simulate the abort procedure of a winged vehicle at launch. It called for flying the airplane at high speed and low altitude across the dry lake bed. By then pulling the aircraft up in a near vertical climb, reducing the jet engine power to idle, and extending the airplane's speedbrakes, he was able to duplicate the flight conditions of the spacecraft aborting under emergency power.

He was then able to practice the landing maneuver and demonstrate its feasibility.

A maneuver like this could be used to practice a similar maneuver for the proposed space shuttlecraft.

The F5D will be displayed at the USAF Museum at Wright-Patterson AFB, Ohio, until the Armstrong Museum is constructed next year.

The F5D is one of four aircraft built by the Douglas Aircraft Co. and the only one still in existence. Following the X-20 work, it was used at NASA's Flight Research Center as a lifting body pilot training device and chase aircraft.

-END-

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FRC NEWS RELEASE:
17-70

FOR RELEASE:
IMMEDIATE

X-24 SCHEDULED FOR FIRST SUPERSONIC FLIGHT

The X-24 lifting body is tentatively scheduled to fly on October 8 to a speed of 720 m.p.h. If successful, this will be the first supersonic flight of the X-24 wingless craft.

John A. Manke, a civilian research pilot for NASA's Flight Research Center will be at the controls.

The X-24 is one of three manned lifting bodies that are being flight tested in a joint NASA/USAF research effort to provide the technology for the development of a reusable space shuttlecraft capable of supplying men and material to orbiting space stations.

This will be the second attempt of the X-24 to attain supersonic flight. The first flight, flown on Aug. 26, was unsuccessful due to malfunction of the rocket engine. A subsequent fire occurred in flight causing minor damage.

-MORE-

A modification to the X-24's fuel jettison system has been made to prevent further occurrences of the fire.

The X-24 will be air launched from a B-52 flying at 42,000 feet near Palmdale, Calif. Following drop, Manke will ignite all four chambers of the rocket engine and begin to climb to higher altitude. Just prior to reaching the planned top speed of Mach 1.1, he will shutdown one chamber. At Mach 1.1 he will shutdown the three remaining chambers and continue climbing to the planned peak altitude of 68,000 feet. Manke will then maneuver the X-24 to the landing pattren at Rogers Dry Lake.

During the flight, he will perform several control maneuvers to evaluate the stability of the X-24 with some of its automatic control systems turned both on and off.

-30-

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FRC NEWS RELEASE:
18-70

FOR RELEASE:
October 12, 1970

AIRLINE PILOTS LAND SIMULATED SPACE SHUTTLE

Actual landing approaches of a four engine jet transport configured to simulate a nearly full-size space shuttle have been successfully flown by two commercial airline pilots. The tests were conducted by the National Aeronautics and Space Administration as part of a study of energy-management techniques for the proposed shuttle orbiter in the terminal area.

Purpose of the test conducted at NASA's Flight Research Center, Edwards, California, was to demonstrate that unpowered approaches and landing maneuvers of this type can be accomplished safely and readily by qualified professional pilots and do not require highly trained test pilots.

Captains Donald C. McBain and James V. Mitchell, both senior captains for United Airline, each flew several simulated shuttle approaches from altitudes of 20,000 feet down to actual touchdown in the 140-foot long NASA research aircraft which is the approximate same size as the orbiter portion of

-MORE-

the proposed space shuttle.

The approaches and landings were made in a so-called 'dirty configuration' with landing gear, spoilers, and landing flaps extended and all engines at idle power. This configuration and power setting combination provides a glide angle or sink rate that is comparable to that predicted for the proposed shuttle.

Four approaches were flown by each pilot. Two were steep (11-degree) straight-in Instrument Landing System (ILS) type approaches: one under visual flight conditions and the other under simulated bad weather conditions with an assumed ceiling of 500 feet. Two 360-degree spiraling approaches were made visually from a position approximately 20,000 feet above the intended landing point. A constant airspeed of 240 m.p.h. (indicated) was held throughout the descent. Energy was controlled by varying the bank or turn angle of the aircraft.

For the past several months, NASA's Flight Research Center has been flying the CV-990 and a B-52 aircraft to demonstrate that this type of approach can be flown safely in vehicles the size of the proposed shuttle orbiter.

Both airline pilots were briefed on flight procedures by Fitz Fulton, B-52/CV-990 project pilot for NASA's Flight Research Center, who also demonstrated each type approach in flight to the two pilots. Fred Drinkwater, NASA's Ames Research Center, Mountain View, California, (home base of the CV-990) flew as safety pilot.

-MORE-

Both airline pilots were able to fly the approaches with ease and touch-down points were all well within acceptable limits.

Both pilots expressed their confidence in this type approach. Mitchell said that he thought, "Any good pilot with the proper type of training should be able to safely fly the approach." Based upon his experience in the tests, McBain said that, "If the shuttle can be guided during entry to an approach gate [electronic or radio navigation point], it could, with proper flight instruments, be landed safely without power, even under relatively poor weather conditions."

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FLIGHT RESEARCH CENTER

Edwards, Calif. 93523 (805) 258-3311 Ext. 221

FRC NEWS RELEASE:
4-71

FOR RELEASE:
Thursday a.m.
March 4
(also being released
in Washington D.C.)

NASA TO BEGIN SUPERCRITICAL WING FLIGHTS

The first flight of a new airfoil shape that could substantially lower the operating cost of future jet transports has been tentatively scheduled by the National Aeronautics and Space Administration for early this month.

The exact flight date depends on the completion of ground tests and favorable weather conditions.

The new airfoil shape is called the NASA supercritical wing and will be flight tested by NASA's Flight Research Center, Edwards, Calif. aboard an extensively modified jet fighter. Thomas C. McMurtry, a civilian research pilot for NASA's Flight Research Center, will pilot the first flight.

At cruise speeds of modern day jet transports, approximately Mach 0.8 or about 530 m.p.h. at a cruising altitude of 35,000 feet, the air flowing over the curved upper surface of the wing reaches supersonic speeds. This results in local shock waves on the wing that cause a sharp rise in aerodynamic drag and a significant decrease in efficiency.

-MORE -

Almost directly opposite from conventional airfoil shapes, the supercritical wing has a flattened top surface. This delays the speed of the air flowing over the upper wing surface from reaching supersonic speeds until the airplane itself is flying at a higher speed. It also moves the shock wave near the back of the wing and increases the total wing efficiency.

To compensate for some loss of lift that results from flattening the top of the wing, the rear portion of the lower surface has been shaped in the form of a concave curve.

The supercritical wing was developed at NASA's Langley Research Center, Hampton, Virginia, in a wind tunnel program under the direction of Dr. Richard T. Whitcomb. These tests indicated that the new airfoil shape could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at cruising altitudes.

If the performance measured in the wind tunnel can be achieved in flight, it should be possible for future aircraft to cruise at the higher speeds with no increase in fuel consumption. This advantage could be converted into increased range and/or, by carrying less fuel, greater payload resulting in lower operating costs per mile.

The prime purpose of the flight test program is to verify the wind tunnel predictions and to explore the operational potential of the supercritical wing in flight.

For the first flight, primarily an operational checkout of the aircraft and the data acquisition system, McMurtry will take-off and land on Rogers Dry Lake bed. The flight speed and altitude will be limited to approximately 350 m.p.h. and 10,000 feet.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
, Edwards, Calif. 93523 (805) 258-3311 Ext. 221

FRC NEWS RELEASE:
7-71

FOR RELEASE:
IMMEDIATE

NASA SUPERCRITICAL WING MAKES FIRST FLIGHT

The first flight of a new airfoil shape that might significantly reduce the cost of future air travel was successfully flown today at the NASA Flight Research Center, Edwards, California.

Called the NASA supercritical wing, it was flown on an extensively modified F-8 jet fighter by Thomas C. McMurtry, a civilian research-pilot engineer for NASA's Flight Research Center.

Because the upper surface of a conventional wing is curved, the air flowing over it travels faster than the speed of the aircraft itself. When this airflow reaches supersonic speeds, local shock waves occur that cause an increase in drag and a loss in efficiency.

The NASA supercritical wing is flattened on the top to slow down the speed of the airflow. This allows the airplane to cruise at a higher speed before the wing airflow reaches the speed of sound. This should increase the overall efficiency of the wing in flight.

The NASA supercritical wing was developed in the wind tunnels at NASA's Langley Research Center, Hampton, Va., under the direction of Dr. Richard

MORE

T. Whitcomb. These tests indicate that the new airfoil could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at a cruising altitude of 35,000 feet.

If the performance measured in the wind tunnels can be achieved in flight, it should be possible for future jet transports to cruise at the higher speed with no increase in fuel consumption. This advantage can then be converted into lower operating costs per mile.

Today's flight was an operational checkout of the aircraft and its systems. Maximum flight performance was restricted to a top speed of approximately 350 m.p.h. and peak altitude of 10,000 feet.

The NASA supercritical wing was constructed for NASA by North American Rockwell. The Vaught Aeronautics Corporation F-8 was loaned to NASA by the U.S. Navy.

-30-

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FRC NEWS RELEASE:
15-71

FOR RELEASE:
June 15, 1971
Also being released
in Washington, D.C.

SUPERCRITICAL WING COMPLETES FIRST FLIGHT TEST SERIES

A new aircraft wing shape that could lower the operating costs of future air transportation has completed its first series of flight tests.

Called the NASA supercritical wing, the new airfoil shape is being flight tested by the National Aeronautics and Space Administration aboard a highly modified Navy F-8 jet fighter at NASA's Flight Research Center, Edwards, California.

Prime purpose of the early flight series was to make a complete operational checkout of the aircraft with its new wing and the various aircraft systems. A preliminary investigation of the effects of the wing at different airspeed and altitudes was also made. No apparent problems were discovered.

The aircraft has begun a two month maintenance period at NASA's Flight Research Center. During this time small irregularities on the wing surface, such as protruding bolt heads, will be smoothed out and a network of approximately 240 pressure sensors will be activated for the next series of flight tests. These sensors, located on the top side of the right wing, will be used to determine the exact location of the shock wave in the air flow over the wing.

-MORE-

The NASA supercritical wing is designed to move the shock wave further back on the wing and to provide increased wing efficiency.

First flown on March 9, 1971, the supercritical wing has made eight flights. On its final flight in this series, flown on May 26, the F-8 attained a top speed of approximately 725 miles per hour, just slightly in excess of the speed of sound. Peak altitude, reached on an earlier flight of the experimental craft was 46,000 feet.

Two civilian research pilots for NASA's Flight Research Center, Thomas C. McMurtry, and Gary E. Krier, have flown the supercritical wing.

Shaped almost the opposite from conventional wings, the supercritical wing has a flat top and a rounded bottom to delay the rise in aerodynamic drag until the aircraft is flying at a higher speed. Wind tunnel studies indicate that the new design should allow aircraft of the future to cruise at higher speeds with no increase in fuel consumption.

-END-

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FRC NEWS RELEASE:
18-71

FOR RELEASE:
July 29, 1971
Also being released in
Washington, D.C.

X-24A LIFTING BODY TO BE RESHAPED

The experimental X-24A lifting body has completed its flight test program and will be converted to a markedly different shape with a new designation, X-24B.

Decision to cease flight operations and begin conversion of the wingless research vehicle was made by the joint Air Force- National Aeronautics and Space Administration flight research team. Both agencies will fund the changes.

The X-24A is one of three lifting bodies flown in a joint program managed since 1967 by NASA's Flight Research Center, Edwards, Calif.

With NASA and Air Force pilots at the controls, the lifting bodies have been investigating the subsonic and supersonic handling qualities, maneuverability and flight problems associated with promising configurations that derive aerodynamic lift from their body shape alone.

-MORE-

The vehicles are air launched from a B-52. Initial flights with each were glide flights. On subsequent missions, a rocket engine was used to reach higher speeds and altitudes. After engine shutdown, the vehicles are maneuvered in gliding flight to a landing on the dry lake bed.

The X-24A, first flown April 17, 1969, has made 28 flights: 10 glide and 18 rocket propelled. Top speed reached by the X-24A was 1,048 miles per hour and the highest altitude was 71,000 feet.

The new shape for the X-24B is based on research done by the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio. The shape has an improved hypersonic lift-to-drag ratio as compared with the lifting body configurations currently flying. The X-24B will not, however, be flown at hypersonic speeds. The new project will investigate how well a vehicle designed for good hypersonic performance will perform at low supersonic, transonic, and subsonic speeds with emphasis on the landing itself.

The X-24B will be built around the existing basic structure and systems but the outer appearance will be changed dramatically. The bulbous shape of the X-24A will give way to a sharply pointed flat-iron appearance.

-MORE-

The nose will be extended 15 feet and the flat bottom surface will become a narrow triangle, flared at the base in what is called a double-delta shape. Unlike the X-24A, there will be no center fin at the rear where the control surfaces are located.

Width at the widest point, the rear, will grow from 14 to 19 feet. The nose extension will increase the total length of the vehicle from 24 to 39 feet. Empty weight will be increased from 6,000 to 7,500 pounds. The same 8,000 pound thrust XLR-11 rocket engine will be installed.

The X-24A will be returned to its builder, Martin Marietta Corp., Denver, for conversion. The modifications are expected to take about a year.

Three test pilots have flown the X-24A - USAF Majors Jerauld R. Gentry and Cecil W. Powell, and NASA civilian John A. Manke.

Other lifting bodies that have been flown in the joint AF-NASA program are the HL-10 and the M2-F3. The M2-F3 is a rebuilt modification of the M2-F2 that made 16 flights early in the program. Both the M2-F2 and the HL-10 were built for NASA by Northrop Corp.

The NASA lifting body flight research effort is a program of the Office of Advanced Research and Technology. Program management is exercised by OART's Entry Technology Office. Results achieved to date have provided a technical base for study of approach and landing techniques for the Space Shuttle. The M2-F3 is being used to test advanced control systems suitable for the Shuttle.

(MORE)

The Air Force phase of the program, aimed at gathering data for designing a vehicle capable of returning from earth orbit and landing at conventional airfields, is managed by the Aeronautical System Division of the Air Force Systems Command. On-site coordination is handled by the Air Force Flight Test Center, Edwards AFB, California.

NEWS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Flight Research Center
P. O. Box 273
Edwards, Calif. 93523

FOR RELEASE:
Wednesday, November 3

FRC RELEASE NO:
26-71

Shuttle
[illegible]

NASA CONDUCTS VISIBILITY STUDIES

A study to determine the minimum amount of cockpit visibility needed by a pilot to safely land his spacecraft is currently underway at the NASA Flight Research Center. Because the proposed space shuttlecraft is being designed to make horizontal ground landings, it will be necessary to provide the pilot with adequate visibility.

In the past, there have been several reduced visibility studies. However, most of these studies were aimed at measuring how closely a pilot with limited visibility could land his aircraft to a predetermined spot. It is now felt that it is more important to determine a pilot's ability to line up and guide the aircraft to the desired runway and to judge his altitude above the ground with limited visibility, particularly in a power-off or glide-flight condition.

A T-33 jet aircraft has been heavily instrumented and outfitted with a radar system that is accurate in judging altitude to plus or minus two feet. Orange plexiglass is installed in the front of the aircraft's windshield in the amount required for the particular test, and the test pilot wears a blue visor. Because it is impossible to see through the orange-blue combination, the pilot's visibility is then

-MORE-

limited to the desired test conditions.

The test maneuver begins with a simulated Instrument Landing Systems (ILS) approach down to an altitude of 200 feet above the ground where the test pilot takes over visually and reduces his jet engine power to idle to simulate the flight conditions of the shuttle in the landing approach. He then looks through the unrestricted portion of the windshield to guide the aircraft to the desired runway where he attempts to level off at five feet above the runway.

Accuracy of the approach is recorded by on-board instrumentation and by cameras on the ground. A safety pilot riding in the back seat monitors the approach.

William H. Dana, John A. Manke and Fitzhugh F. Fulton, Jr. are the project pilots. Dana and Manke were assigned because of their lifting body flight experience and Fulton was assigned because of his experience flying large aircraft like the XB-70 and B-52.

The flights, which started last July following seven months of ground preparations, began with five degrees of visibility restriction on either side of the front center of the canopy. Over 225 approaches have since been flown and the visibility restriction has grown to 75 degrees on either side. This means a total of 150 degrees of forward visibility is being restricted. It is planned to increase this to a total of 160 degrees.

To date, it appears that the pilots can safely land the aircraft with greater visibility restrictions than it was originally thought possible. At the higher limitations, the pilot's workload increases and their performance tends to decrease.

It is planned in the future to make additional flights with larger aircraft and at more restrictive landing areas.

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FOR RELEASE:
February 2, 1972
Also being released in
Washington, D.C.

FRC RELEASE NO:
1-72

NASA CLEAR AIR TURBULENCE RESEARCH

The National Aeronautics and Space Administration is working together with the Department of Transportation to better define the characteristics of clear air turbulence and to develop methods of detecting it in flight.

Clear air turbulence (CAT) is that usually invisible natural phenomenon that occasionally tosses airplanes around with its sudden onslaught of violent motion.

At the NASA Flight Research Center, Edwards, California, a B-57 aircraft is being flown to carry experimental instruments. The flights are made throughout the western part of the United States, at altitudes ranging up to 15 kilometers (50,000 feet), in areas where turbulence is expected to be found or where it has been reported by other aircraft. If actual turbulence is encountered, a 30-minute flight pattern is flown to record data while repeatedly probing the turbulent area.

Thirteen flights have been flown since the B-57 tests began approximately one year ago.

The right wing tip pod of the B-57 carries the DOT-sponsored prototype

-MORE-

radiometric sensor that may be able to detect CAT up to 80 kilometers (50 miles) ahead of the aircraft. At jet transport speeds, this remote detection would provide a three to five minute advance warning of impending turbulence.

The DOT sensor is designed to receive microwave signals associated with the air temperatures ahead of the airplane. Other studies have shown that abrupt temperature variations are usually associated with CAT. The B-57 flights are conducted to determine the amount of advance warning time that is possible with this type of detection equipment and to find out how well it can distinguish between false detections.

Working under a NASA grant, the University of Wyoming has installed an aerosol and ozone detector on the B-57. This device counts aerosol particles in the one-fourth micron and larger range, using a pulse height analyzer and a photomultiplier. The research is aimed at determining if there is a positive relationship between the presence of aerosols and/or ozone and the atmospheric conditions that cause CAT.

In related research, the NASA Langley Research Center, Hampton, Virginia is developing a flight system to investigate the characteristics of CAT caused by various types of air flow in the atmosphere. Later this year the B-57 will carry this system to investigate the amount of energy contained in various sizes of turbulent eddies.

The NASA Marshall Space Flight Center, Huntsville, Alabama, is seeking to adapt laser doppler technology for use in future flight research programs.

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NASA NEWS

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FOR RELEASE:
March 1, 1972
Also being released in Washington, D.C.

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2-72

FLIGHT TESTS VERIFY NASA SUPERCRITICAL WING CONCEPT

Actual flight tests of the NASA Supercritical Wing have demonstrated that the new airfoil shape does permit jet aircraft to operate more efficiently at speeds near Mach 1, the speed of sound.

This conclusion and other results from the flight tests of the new aeronautical concept were described yesterday 2/29 by the National Aeronautics and Space Administration at a one-day technical meeting at NASA's Flight Research Center, Edwards, California, which conducted the flight tests of the new wing on a modified F-8 jet fighter.

The NASA Supercritical Wing was developed in wind tunnels under the direction of Dr. Richard T. Whitcomb at NASA's Langley Research Center, Hampton, Virginia. The top side of the new wing has been flattened and the rear portion of the underside is curved concavely.

The flight tests confirm the wind tunnel predictions that the aircraft would be able to fly at increased speeds before encountering a significant rise in aerodynamic drag, an adverse force on the aircraft. This means that the aircraft can fly faster without using more power.

Since its first flight on March 9, 1971, the F-8 with the Supercritical Wing

- MORE -

has made a total of 27 flights reaching a top speed of Mach 1.2, about 1267 kilometers per hour (792 mph) and a peak altitude of 15 kilometers (51,000 feet).

Summarizing the flight test program, Joseph Weil, Director of Research at NASA's Flight Research Center and Chairman of the afternoon session of the meeting said, "I feel that the overall performance goals of Dr. Whitcomb, as demonstrated by the delayed drag rise, have been achieved. Overall agreement between the wind tunnel and flight data is quite good."

Reporting on the piloting aspects of the new wing, civilian project pilot Thomas C. McMurtry said that the flight test program indicated that the piloting procedures and tasks at near-sonic cruise speeds should be as routine as present day jet transport operations. He concluded, "The introduction of the Supercritical Wing is not expected to create any serious problems in day-to-day air transport operations."

For applications in which near-sonic speed is not required, the advantages of the Supercritical Wing permit a thicker wing section with a resultant saving in structural weight, and an increase in useable internal volume. At the meeting a report on the flight tests of a thick supercritical wing mounted on a T-2C jet trainer was made by William E. Palmer of the Columbus Division of North American Rockwell who made the flights under joint NASA-U.S. Navy sponsorship.

Future plans for the Supercritical Wing were also described at the meeting. These included the addition of side fairings for increased area ruling, a configuration more likely to be used with a Supercritical Wing on commercial jet aircraft,

- MORE -

and the determination, by simulation, of the effects of wing roughness that might be caused by manufacturing imperfections. Plans for possible follow-on flight programs to further the readiness of the new technology for industry applications are currently being developed.

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FOR RELEASE:
Immediate

FRC RELEASE NO:
5-72

NASA AWARDS SUPPORT CONTRACT

The NASA Flight Research Center, Edwards, California, has selected Serv-Air, Inc., Enid, Oklahoma, for final negotiations of a contract to perform Administrative Technical Support Services at the NASA aeronautical flight test facility. Six firms had submitted proposals for this procurement.

The cost-plus-award-fee contract is for one year with provisiors for two one-year extensions. The estimated cost for the first year is expected to be $1, 173,000.

Serv-Air will perform inventory management for aircraft maintenance supply and general supply. In addition, they will be responsible for facilities operation and maintenance.

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FOR RELEASE:
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8-72

NEW FLIGHT CONTROL SYSTEM SCHEDULED FOR FIRST FLIGHT

The first flight of an aircraft that uses a flight control system with equipment developed for manned spacecraft has been tentatively scheduled by NASA for May 18. Called the Digital Fly-By-Wire (DFBW) system, it may be the forerunner of flight control systems for aircraft of the future.

This will be the first flight of an aircraft that is completely dependent upon the advanced electronic control system, and has no mechanical back-up system. It will also be the first flight test of this type of flight control system which has been specified for use on the Space Shuttle.

The advanced system has been installed by NASA's Flight Research Center, Edwards, California, in a modified F-8 jet aircraft originally built by LTV Aerospace, Dallas, Texas for the U.S. Navy, and made available to NASA. Heart of the control system is a digital computer and an inertial measuring unit that were

-MORE-

developed for the flight control system of the Apollo Lunar Module.

Use of this kind of control system could make air travel of the future smoother by reducing many of the aircraft vibrations caused by turbulent air with quicker, automatic response from the computer to the aircraft controls.

The DFBW system should also ease the pilot work load and allow him more time for other important tasks, such as navigating and manually keeping the aircraft on the desired flight path.

Because the advanced control system could electronically provide the necessary aircraft stability, it may be possible on future aircraft to reduce the size of large structural components such as tail surfaces and even to relocate others. This could reduce the basic weight and drag of the future aircraft which may make it possible to increase their payload and/or flight performance.

With several sets of electronic wires replacing the mechanical parts, the new control system should be as reliable as a mechanical system and, for future military aircraft, may prove to be less vulnerable to battle damage.

The mechanical flight control system, consisting of metal push rods, bell cranks, control cables, etc., has been removed from the F-8 by engineers and technicians at NASA's Flight Research Center. It has been replaced with several different sets of wire-bundles that lead from the pilot's control stick to the computer and then to the control surfaces.

The pilot's commands are sent electronically from the control stick to the computer. Information about the motion of the aircraft and the forces that are influencing the aircraft are sensed by the inertial measuring unit and also sent to the computer. The computer then digests the information from both sources and electronically sends the corrected commands to the control surfaces.

A secondary flight control system consisting of three separate fly-by-wire analog channels serves as a back-up control system.

Up to this time, fly-by-wire aircraft operation has been limited to pseudo-fly-by-wire analog systems; that is, the mechanical back-up system is retained. Such a system is used in the British/French Concorde.

The increased flexibility and other advantages of a digital fly-by-wire system over analog systems for flight control of a spacecraft have been demonstrated in the Apollo program. The DFBW program is designed to transfer this technology for aircraft applications.

The first flight will be a flight check of the DFBW system and the back-up system. It will be limited to a maximum speed and altitude of 680 kilometers per hour (425 mph) and 600 meters (20,000 feet). Gary E. Krier, a civilian research pilot for NASA's Flight Research Center, is the project pilot and will make the first flight.

The inertial guidance unit and digital system hardware were developed by Delco Electronics, Milwaukee, Wisconsin. The digital computer was built by The Rayetheon Company, Cambridge, Mass. and programmed by the Charles Stark Draper Laboratories of the Massachusetts Institute of Technology, Cambridge, Mass. The electronic control actuators were built by the Hydraulic Research and Manufacturing Company, Valencia, California. The back-up control system was developed by the Sperry Flight Systems Division, Phoenix, Arizona.

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FOR RELEASE:
Immediate

FRC RELEASE NO:
13-72

NASA SELECTS TEST RANGE CONTRACTOR

The NASA Flight Research Center, Edwards, California, has selected the RCA Service Company, a division of the RCA Corporation, Camden, New Jersey, for final negotiating of a contract to support the NASA Aerodynamic Test Range.

The NASA Aerodynamic Test Range is comprised of radar/communication sites located 550 kilometers (300 nautical miles) apart, which provides an 1850 kilometer (1000 nautical miles) long high speed flight corridor, extending from mid-Washington state to Edwards, California. The northern radar site is located at Ely, Nevada and the southern site is at the NASA Flight Research Center.

Most of NASA's advanced flight research as well as that of other government agencies is conducted in this corridor. Such NASA flight programs as the wingless lifting bodies, triple-sonic YF-12, Supercritical Wing, and Digital Fly-By-Wire aircraft are being flown in the corridor.

The test range includes monitoring, telemetry, and computer facilities for the tracking of test aircraft and the collection of in flight data.

The cost-plus-fixed-fee contract is expected to cost approximately $359,000 and will commence August 1st, with provisions for four additional one year options.

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7/18/72

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FOR RELEASE:
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FRC RELEASE NO:
14-72

NASA CONTRACTS FOR LOW COST FLIGHT DIRECTOR DISPLAY

A low cost flight director for use in commuter-type and general aviation aircraft is being studied under a contract awarded by NASA's Flight Research Center, Edwards, California.

A flight director is a visual display that presents information telling the pilot what to do to reach his objective as opposed to conventional flight instruments that only tell him what is happening to the airplane at that time.

Earlier flight studies conducted by the NASA Flight Research Center demonstrated that the use of a flight director display results in a significant improvement in the pilot's ability to fly the airplane. This is particularly true in adverse weather conditions when the pilot has little or no outside visual references and must rely on his flight instruments as his primary source of information.

Most commercial airlines use flight directors. However, the cost of this type of display makes them prohibitive for general aviation owners and small commuter-type airlines, the users that might benefit most from them.

Typical cost ranges for flight director systems range from $12,000 to $18,000 with one "low cost" system advertised for $9,995. The NASA contract is directed at developing a system that may cost the consumer less than $2,000.

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The NASA Flight Research Center has awarded a $28,000 contract to the Astronautics Corporation of America, Milwaukee, Wisconsin, to develop the low-cost flight director for commuter-type aircraft. The company is to provide the design specifications and engineering drawings which would make it possible to commercially produce the flight display.

The design specifications from Astronautics will be used by the Flight Research Center for future competitive procurement of prototype hardware to be flight evaluated in a general aviation type aircraft by NASA.

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7/24/72

NEWS
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE:
Sunday, September 3

FRC RELEASE NO:
15-72

NASA FLIGHT RESEARCH CENTER
TO CELEBRATE 25th ANNIVERSARY

The site of a great portion of this country's advanced flight research will observe its 25th Anniversary next month. NASA's Flight Research Center, Edwards, California, will celebrate its silver anniversary on September 8 with ceremonies and an open house. The Center will also be open to the public on Saturday, September 9, from 10:00 a.m. to 3:00 p.m.

A special ceremony with NASA Administrator Dr. James C. Fletcher will honor the Center and the original 14 employees who came to Muroc Dry Lake to participate with the U.S. Air Force with flights of the X-1, the first aircraft to exceed the speed of sound in level flight.

Since that time, the Flight Research Center, working in close cooperation with the military and the aerospace industry, has participated in the flight research programs of almost all of the X-series aircraft that have extended the boundaries of manned aeronautical flight, from subsonic speeds to speeds

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in excess of six and one-half times the speed of sound and at near orbital altitudes. Efforts at the Center have also significantly contributed to the manned space program as well as commercial and general aviation.

A partial list of the major programs conducted at the NASA Flight Research Center are:

PROJECT	DATES	SPEED/ALTITUDE	REMARKS
X-1	1947-1951	950 mph/70,000 ft.	Three X-1 aircraft were flown to investigate stabilit and control at speeds from just under to just above the speed of sound. The X-1 was the first aircraft to ex- ceed the speed of sound.
D-558 I	1947-1953	650 mph/40,000 ft.	Jet powered, the D-558 I was flown to determine aircraft characteristics at high subsonic speeds.
D-558 II	1948-1956	1250 mph/83,000 ft.	A rocket-powered version c the D-558, the Skyrocket w the first aircraft to fly twic the speed of sound and evalı ated the swept-wing concep at high supersonic speeds.
X-4	1948-1953	625 mph/40,000 ft.	The jet-powered X-4 aircra was used to investigate the stability and control of a se tailless aircraft at high sub sonic speeds. The X-4 had no horizontal tail surfaces.
X-5	1951-1953	700 mph/50,000 ft.	The X-5 was the first aircr capable of sweeping its win in flight. It is the predeces of such aircraft as the F-11 F-14 and B-1.

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XF-92A	1951-1953	650 mph/45,000 ft.	The XF-92A was the first delta-wing jet and the forerunner of the F-102, F-106, and the B-58. It was flown to obtain pitch-up information and stability and control data.
X-3	1952-1956	800 mph/40,000 ft.	Powered by two jet engines, The X-3 Stiletto was designed to investigate sustained high speed cruise and was the first aircraft to make extensive use of titanium.
X-1A, X-1B	1954-1958	1275 mph/90,000 ft.	Follow-on versions of the X-1, these two aircraft expanded performance and examined aerodynamic heating. The X-1B was the first aircraft to use reaction controls, a predecessor of the ballistic controls used on the X-15 and manned spacecraft.
X-1E	1955-1958	1500 mph/73,000 ft.	The X-1E was the second of the original X-1 aircraft that was modified with a new high speed thin wing.
X-15	1959-1968	4500 mph/354,000 ft.	Called the most successful of all the research aircraft, the three X-15 aircraft were used as general tools for manned hypersonic (Mach 5) research. Important information on heating, structures, stability and control, piloting aspects, etc., was acquired with the program as well as utilizing the aircraft as a test bed to carry various scientific experiments to the edge of space on a regular basis. Designed for aeronautical research, the X-15 contributed significantly to the manned space program.

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M2-F1	1963-1967	150 mph/13,000 ft.	The M2-F1 was a low-cost research vehicle that was air-towed to free flight to investigate the lifting body concept for future use.
LLRV	1964-1967	70 mph/1000 ft.	The Lunar Landing Research Vehicle was a free flying simulator used to investigate the piloting aspects and operational procedures for the final portion of the lunar landing. It was a prototype of the trainer used by the Apollo astronauts.
XB-70	1964-1969	2000 mph/70,000 ft.	Originally built as a USAF bomber, two XB-70 aircraft were used to obtain in flight data of a large aircraft capable of cruising at Mach 3. It weighed over 500,000 lbs. at take-off.
General Aviation	1964-Present	200 mph/20,000 ft. (approximate)	A continuing effort to provide research to improve safety, utility and general flying qualities of general aviation aircraft.
M2, HL-10 X-24A	1966- Present (M2 only)	1200 mph/90,000 ft.	Flights with the three lifting bodies are validating the concept for the design of future manned spacecraft and aircraft. The three wingless craft are air launched and then use a rocket engine to climb to higher speeds and altitudes before maneuvering to a glide landing.
YF-12	1970-Present	2000 mph/80,000 ft. plus	The YF-12 aircraft are being flown as a continuation of the XB-70 to acquire in flight data for the design of future supersonic aircraft, both commercial and military. In addition

			to aerodynamic loads, propulsion and stability and control research, several advanced systems are being evaluated for possible use on future aircraft designs.
SCW	1971-Present	800 mph/50,000 ft.	The NASA Supercritical Wing is presently being flown on a modified F-8 to evaluate the new wing's ability to permit the aircraft to cruise at higher speeds with no increase in fuel consumption. It is planned to place the new wing shape on a military aircraft to study its potential for military applications.
DFBW	1972-Present	750 mph/50,000 ft.	The Digital Fly-By-Wire aircraft is the first aircraft to rely completely upon an electronic flight control system. This type of flight control system, which is being considered for use on the space shuttle, should make air travel of the future smoother. The system uses a computer and inertial measuring unit from the Apollo spacecraft.

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8/22/72

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FOR RELEASE:
October 2, 1972

FRC RELEASE NO:
16-72

Also being released in Washington, D.C.

NASA DEVELOPS NEW FLIGHT TEST TECHNIQUE

An extensively modified twin-engine test aircraft has been successfully landed by remote control by NASA's Flight Research Center, Edwards, California.

A 1500 kilogram (3500 lb) Piper Commanche (PA-30) was landed on the dry lakebed here under the control of a pilot sitting in a ground cockpit located several miles away in the control room of the NASA facility. A safety pilot was on board the aircraft.

The landing test was part of a demonstration of a new flight test technique that could provide an economical and far less hazardous means of testing advanced aircraft and spacecraft of the future. The new method is not intended to replace manned flight testing but would be used where there is a high degree of risk that

-MORE -

the test aircraft would be severely damaged with possible physical injury, or where costs would preclude a manned full-scale flight test vehicle.

The new method will involve the air launch of large scale models, up to nine meters (30 feet) long, called Remotely Piloted Research Vehicles (RPRV) from carrier aircraft. A test pilot in a ground cockpit complete with flight controls and flight instruments will fly the RPRV through the desired test maneuvers using telemetry and television.

Initially, a parachute system will be used for recovery. However, future technique development may permit landings of the RPRV under the control of the ground test pilot. The landing tests are part of this development program.

As opposed to other remotely piloted vehicles that use an autopilot type of control system, the test pilot of the RPRV will remain in continuous direct control of the test model at all times using conventional flight controls and a complete set of flight instruments. This allows the pilot to perform all of the precision flight maneuvers such as wind-up turns, control pulses and other unusual control maneuvers required for flight test operations.

To develop the new technique, engineers and pilots at NASA's Flight Research Center have been flying the twin-engine aircraft with a preliminary version of the control system. Telemetry is used to send control commands to the aircraft and flight information back to the pilot displays in the ground cockpit. The ground pilot uses television and radar to navigate the plane from place to place.

The landing tests completed the initial stage of the test technique development which began in October 1971. Thomas C. McMurtry was the airborne pilot during the landing tests which were controlled by Einar K. Enevoldson in the ground cockpit.

The present phase of the RPRV test technique development program is the introduction of a computer into the ground control system to provide the capability to match the sophisticated control systems of modern day aircraft. Control inputs from the ground cockpit are fed through the computer which has been pre-programmed with the flight characterisitics and simulated control system of the test aircraft. The use of the computer will permit the use of an uncomplicated and low cost type of control system in the RPRV and still represent a complex control system in the proposed full scale aircraft.

First planned application of the RPRV test method will be to conduct stall/post stall tests of the Air Force F-15 fighter aircraft. Three three-eights scale models of the F-15, about seven meters (24 feet) long, are being built for the tests which are tentatively scheduled for early next year. The models will be air launched from a B-52 and then flown through the desired test maneuvers by the ground pilot, and then recovered by parachute.

The RPRV tests will be direct support of the Air Force full scale flight test program.

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9/20/72

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FRC RELEASE NO:
21-72

FOR RELEASE:
11/27/72

SHUTTLE SIMULATION FLIGHTS PLANNED

NASA's Flight Research Center will soon begin a series of tests to evaluate a method of simulating the orbiter part of the Space Shuttle in flight at subsonic speeds.

The tests will be conducted this week on the Flight Research Center's General Purpose Airborne Simulator (GPAS), a converted subsonic jet transport that is equipped with an electronic variable stability and control system.

The flights are designed to determine the ability of aircraft of this type to match the final approach path of the orbiter in steep descent from 9 kilometers (30,000 feet) down to landing. The flights will be made to evaluate the feasibility of using in-flight thrust reversing to effectively simulate the performance of the orbiter both with and without landing engines.

Thrust reversers are mechanical devices that are used to divert forward the thrust from the aircraft engines. They are normally used as a breaking or slowing force on the aircraft during rollout following landing.

- MORE -

Two of the aircraft's four engines will be reversed in flight and run at varying power settings in order to reduce the normal lift/drag ratio of the test aircraft to that anticipated for the shuttle orbiter during this portion of its flight. Speed brakes, landing gear, and other devices will also be extended if necessary to achieve the desired lift/drag ratio to give the steep glide angle.

The program is in support of two study contracts awarded earlier by NASA's Manned Spacecraft Center, Houston, Texas. Data from the NASA Flight Research Center tests will be made available to the two contractors, Grumman Aerospace Corporation, Bethpage, New York, and Lockheed Aircraft Corporation, Marietta, Georgia, to aid them in their study of airborne simulation of the orbiter. The studies are aimed at providing assurance to NASA that the proposed shuttle training aircraft is technically feasible and acceptable.

- END -

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11/26/72

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FOR RELEASE:
Immediate

FRC RELEASE NO:
3-73

INSTRUMENTATION REUSE SAVES $1 MILLION

A savings of almost $1 million over the past several years has been realized by the government by the resourcefullness and ingenuity of engineers and technicians at NASA's Flight Research Center, Edwards, California.

As the Flight Research Center was preparing for the flight research program with the triple-sonic YF-12 aircraft, it became apparent that instrumentation would be required that would be capable of withstanding the extreme high temperatures (in excess of 600° F) that would be encountered in flight.

Cost of developing and building the instrumentation was estimated at over $950,000 and a considerable amount of time.

However, it was discovered that a similar type of instrumentation had already been developed for use in the XB-70 in a high temperature environment. Samples of the instrumentation were acquired and tested for use in

-MORE-

the more severe environment of the YF-12. They were found to be fully acceptable and put into use.

The instrumentation has proved to be so reliable that last month two instrumentation technicians traveled to the Air Force Museum, Wright-Patterson AFB, Ohio, to remove the remaining transducers from the XB-70 which is on static display there.

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FOR RELEASE:

FRC RELEASE NO:
7-73

Thursday, April 5

NASA REPORTS ON GENERAL AVIATION STUDIES

The federal space agency has not forgotten the almost one million people in this country who own and fly general aviation type aircraft.

Technical reports given today by engineers from the NASA Flight Research Center, Edwards, California, at the Society of Automotive Engineers Business Aircraft meeting in Wichita, Kansas, described NASA research aimed at not only improving the flight control systems in general aviation type aircraft, but at methods that would permit more wide-spread use of new flight equipment.

Because pilot error appears to be the largest cause of flight

-MORE-

accidents, the NASA effort is directed at making the flying task easier for the pilot by providing improved flight control systems and finding ways of lowering the cost of specialized flight information displays.

During the past several years, various types of subsystems such as wing levelers, all-fluidic autopilots, yaw dampers and others were evaluated by NASA in flight and found to offer certain advantages during particular portions of the total flight. However, it was also determined that a pilot would have to have several or all of these systems to be truly effective during the major portion of the flight.

Utilizing experience gained with NASA's stable of experimental aircraft, a research control system with sufficient capability to evaluate several different methods of control was installed on a test bed aircraft. Flight tests of these various systems showed that a system which makes flight path control similar to steering an automobile provides significant improvement over the conventional control systems.

The new system, called Attitude Command Control system, offers both improved flying characteristics for the pilot and smoother ride qualities for the passenger.

In addition to the research control system, an improved flight display was installed on the test bed aircraft. This display is a totally integrated display of the flight director type presently in use on commercial airliners which, in addition to just presenting aircraft situation information, gives control commands to the pilot.

It appears that the use of the control system and the flight director can significantly reduce the workload of the general aviation flying task throughout most of the flight envelope. Unfortunately at the present time, the costs of these systems preclude their wide-spread use in general aviation.

Therefore, NASA has begun several programs directed at providing more economical implementation of these systems.

Last year the NASA Flight Research Center competitively awarded a contract to the Astronautics Corporation of America, Milwaukee, Wisconsin, to develop a low cost flight director for general aviation use. The new design resulting from this study is targeted to cost the consumer less than $3000, a reduction of almost 70 per cent from those presently available.

The University of Kansas has developed a system that provides stability augmentation to light aircraft by means of small control surfaces in addition to the normal aircraft control surfaces. This system, called Separate Surface Stability Augmentation (SSSA) system, combined with an attitude command control system, shows promise from the standpoint of economy.

To further this concept and to maximize the benefits of the improved system, the University of Kansas is working under a NASA grant to evaluate the system on board a modified commuter airliner. Flight tests are expected to begin early next year.

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3/20/73

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FOR RELEASE:

FRC RELEASE NO: 8-73

Immediate

MEMO TO EDITORS:

Gary E. Krier, NASA's Fly-By-Wire project pilot was recently asked to address the House Subcommittee on Authorizations, on our Fly-By-Wire program.

Enclosed is a copy of his talk which gives a good description of the program and its advantages for application to the design of future aircraft which we thought you might be interested in reading.

Ralph B. Jackson
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3/23/73

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
EDWARDS, CALIFORNIA 93523

REPLY TO
ATTN OF:

Mr. Chairman, Members of the Subcommittee:

Last May I made the first flight in NASA's Digital Fly-By-Wire F-8 aircraft. This was the first aircraft to fly without a mechanical back-up for its flight control system. I'd like to talk about the significance of Fly-By-Wire.

I think that it's best to first define fly-by-wire by showing the evolution of aircraft flight control systems. We used cables to control aircraft from the Wright brothers up to World War II, but with the advent of the jet airplane, speeds got so high that control forces couldn't be overcome by muscle alone, so the hydraulic system came into use. This type of system is designed such that the air loads are not transferred back to the pilot. Both of the above systems are physically heavy and mechanically complex.

Implied in the discussion of these two systems is the fact that the pilot's brain and the seat of his pants, if you will, are "in the loop." They are supplying information to his senses that the airplane is doing what he wants it to do when he issues a command through the control stick. This is satisfactory as long as the airplane is naturally stable. If it's not inherently stable then "artifical stability" must be provided. This is done by using an all electric flight control system called "fly-by-wire.

It is an extremely fast reacting system which provides exactly the right amount of control response through intelligence inserted into the digital computer memory - digital because of the tremendous flexibility of this type of computer.

Too much stability can penalize the performance of an aircraft. If we reduce the stability, these penalties begin to disappear but the aircraft becomes difficult, if not impossible, to control without fly-by-wire. There are designs currently on the horizon which require fly-by-wire. They are called control configured vehicles (CCV) which means that the aerodynamic design and stability of the aircraft are such that it couldn't fly without a sophisticated, quick response flight control system.

Airliners that we'll ride in the 1980's could profit from fly-by-wire in the form of smooth flight at very high speeds and the near elimination of the response to turbulence by computer application of smoothing controls.

NASA's initial objective in this program was to establish the feasibility of digital fly-by-wire by flight test as quickly and safely as possible. We did this by using refurbished Apollo equipment and two surplus F-8 fighters given to us by the Navy. Using this approach, we estimate that we flew about two years earlier than we otherwise could have.

Our system layout used conventional control stick and rudders which send commands to the Apollo computer. The computer then sends electrical signals to a secondary actuator which converts the electrical signals to hydraulic output and, therefore, control surface motion. NASA had this actuator developed especially for this program. The desired flight characteristics are loaded into the computer through the display and keyboard (DSKY) and the pilot calls up these flying characteristics by punching a button on the mode (instrument) panel.

Our simulator, which is a decommissioned F-8, is an exact duplicate of the aircraft including flightworthy hardware, I spent almost 100 hours evaluting the system and examining emergency procedures. At least 20 times that amount of time was spent on engineering studies on this simulator by our engineers. Just to put this in perspective, the military services allocate only ten hours to solo a new pilot.

All this work prepared me very well for the first flight because I felt we had examined every possible situation which could occur and had recourse for any emergency. The first flight went exactly as planned, but was still an exhilarating experience, because as I mentioned, this was the first time an airplane had ever been flown without a mechanical back-up for the flight control system.

To date (March, 1973) we've flown 15 flights with no major problems, which is quite an accomplishment when you consider that in flight tests the first flights are usually the riskiest. The undesireable characteristics that we uncovered were changed by reprogramming the computer memory. We do this by means of a mylar tape.

There will be an increasing need for fly-by-wire as time goes on. As previously mentioned transport performance and passenger comfort will be enhanced by it, as well as making transport flying safer because of slower landing speeds and more precise control.

By far the best use of fly-by-wire is to build a control configured vehicle whose potential gains are enormous. This display is an artist's conception of what our F-8 would look like if control configured.

Control configured vehicles offer reduced drag and increased lift which means longer range and increased maneuverability, and slower approach and landing speeds, therefore smaller carrier decks and runway lengths. It has been estimated that landing speed could be cut by 25% and range increased 15% with no sacrifice in mission capability, just by modifying existing aircraft.

A much larger improvement in performance could be gained by starting from scratch with fly-by-wire. We have been refining aircraft for years now, and the FBW/CCV combination gives us a chance to make a quantum jump in aircraft performance.

In summary, then, what NASA had done was to anticipate the requirements of the next generation of aircraft and has taken steps to develop the technology for the aerospace industry and, ultimately, the public.

NASA NEWS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Flight Research Center
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Edwards, Calif. 93523

FOR RELEASE:
Immediate

FRC RELEASE NO:
9-73

ILIFF NAMED AS NASA'S OUTSTANDING HANDICAPPED EMPLOYEE

A young engineer at NASA's Flight Research Center has been selected as the Outstanding Handicapped Federal Employee of the Year for the National Aeronautics and Space Administration. Kenneth W. Iliff, a 32-year old aerospace technologist who was stricken with bulbar and paralytic polio as a youth, was further nominated for the same award for the entire Federal government by NASA Administrator Dr. James C. Fletcher.

Permanently confined to a wheelchair, Iliff has not let his handicap slow down his active life, both professionally or with his involvement with community affairs.

In addition to his NASA activity as an aeronautical engineer and theoretical

-MORE-

analyst working with some of the most advanced experimental aircraft in the world, he was elected as the non-minority member of the local Equal Employment Opportunity Committee at the Flight Research Center, and has been active in the March of Dimes organization.

A native of West Union, Iowa, Iliff earned his B.S. degrees in both math and aeronautical engineering from Iowa State University in 1962. He received his Master's degree in 1967 from the University of Southern California and will receive his Ph.D. in mathematical theory of systems from UCLA in June.

At the NASA Flight Research Center Iliff has helped develop several advanced analytical techniques, the most recent being concerned with optimal parameter estimation. This latter contribution is not only a significant advancement in the state of the art, but has made it possible to obtain certain flight test data which was previously unobtainable.

-30-

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4/9/73

NEWS
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Flight Research Center
P. O. Box 273
Edwards, Calif. 93523
FOR RELEASE:
IMMEDIATE

FRC RELEASE NO:
10-73

Also being released in
Washington, D.C.

HIGHLY MANEUVERABLE AIRCRAFT STUDY CONTRACTS AWARDED

Seven aerospace companies have been selected by NASA's Flight Research Center to conduct individual studies that could lead to advanced technology for the design of highly maneuverable aircraft of the future.

Separate $10,000 contracts are being awarded to: Boeing Aerospace Co., Seattle, Washington; Development Sciences, Inc., City of Commerce, California; General Dynamics Corp., Burbank, California; LTV Aerospace Corp., Dallas, Texas; Northrop Corp., Hawthorne, California; Rockwell International, Los Angeles, California; and Teledyne Ryan Aeronautical, San Diego, California.

Under the terms of the contract, each firm will have three months to define its design concept and prepare a preliminary plan for developing the design technology. For purposes of the study, all conventional design restraints are relaxed and contractors are encouraged to make maximum use of recent advances in the state of the art. Information gained from the $10,000 studies will be treated as proprietary by NASA and not disseminated to other individual contractors.

-MORE-

Based upon the results of the studies, several contractors may be selected for further contracts of approximately $200,000 each for preliminary design of their respective design concepts. A subsequent competition may be held for award of a contract for final design and construction of a subscale research vehicle that would be tested using the remotely piloted flight research technique.

This flight research technique, which will be used to flight test 3/8's scale models of the USAF's F-15 fighter this summer at NASA's Flight Research Center, is far less hazardous and considerably less expensive than man-rated aircraft.

-30-

Ralph Jackson
(805) 258-3311 5/1/73

2. FRC release 10-73 (May 1, 1973) -

should have been nine contractors; two were omitted -

Grumman Aerospace Corp.
Lockheed - California Co.

per FRC PIO on phone with
C. Karegeannes, Sept. 28, 1973.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Flight Research Center
P. O. Box 273
Edwards, Calif. 93523

FOR RELEASE:

FRC RELEASE NO: 15-73

Tuesday, June 26, 1973

NASA AWARDS FLY-BY-WIRE CONTROL SYSTEM CONTRACT

The NASA Flight Research Center has awarded a $1.6 million contract to the Charles Stark Draper Laboratory (CSDL), a division of the Massachusetts Institute of Technology, Cambridge, Mass., to provide the software for an improved control system to be used in NASA's Digital Fly-By-Wire experimental aircraft.

Under the terms of the cost-reimbursable contract, the laboratory will provide the software and necessary input/output (I/O) hardware for a dual channel digital fly-by-wire flight control system that will offer a significant opportunity to further advance digital fly-by-wire

-more-

technology. The dual system will replace the single channel digital system currently undergoing flight tests, which utilizes hardware originally developed for the Apollo space program.

The NASA Flight Research Center is flying an extensively modified F-8 jet fighter in which the mechanical flight control system has been removed. For control, the pilot's inputs are transmitted over a system of electrical wires to a digital computer originally developed for the Apollo spacecraft and are then transmitted to the flight control surfaces.

The new system will employ off-the-shelf, state-of-the-art, fully programmable airborne digital computers which are being procured separately by NASA to be supplied as government furnished equipment to the CSDL. The increased programming flexibility afforded by the computers will result in greatly increased research capability in the area of advanced control laws for digital applications.

The application of fly-by-wire flight control technology to future aircraft designs could result in significant weight savings, performance improvements and improved flying qualities. A current application of this technology is the space shuttle flight control system which is a digital fly-by-wire system.

-30-

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6/22/73

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE:

FRC RELEASE NO:
16-73

Monday, July 16, 1973
Also being released
in Washington

FIRST X-24B FLIGHT SCHEDULED

The first flight of the X-24B has been tentatively scheduled by NASA's Flight Research Center for not earlier than July 20. The exact date will depend upon the completion of several remaining preflight checks.

The X-24B is the successor to the wingless lifting bodies that were flown in a joint USAF-NASA research program to demonstrate man's ability to maneuver and safely land a vehicle with a shape that had been designed for reentry from space flight. The X-24B is also representative of a configuration that could be the forerunner of future aircraft capable of hypersonic (Mach 5+) cruise flight.

For economic reasons, the X-24B was built around the existing basic structure and subsystems of the X-24A. However, the outside

-MORE-

shape has been significantly changed. It now has a double-delta shape with small blended wings and three vertical tails. The X-24B has an extremely flat bottom and a round top. It is 11 meters (37 feet) long, 6 meters (19 feet) wide and 3 meters (10 feet) high. The sharply pointed research craft weighs approximately 3600 kilograms (8000 lbs) empty and can carry about 2200 kilograms (5000 lbs) of rocket engine fuel.

Like its predecessors, the M-2, HL-10 and X-24A, the X-24B will utilize a B-52 for air launch from a planned altitude of 13 kilometers (40,000 feet). The initial flights will be glide flights and the XLR-11 rocket engine will not be used. Following launch, the pilot will maneuver the X-24B through a series of stability and control tests and then to a glide landing onto the dry lakebed here. Subsequent flights will use the rocket engine to increase speed and altitude performance.

The first flight will be piloted by John A. Manke, a civilian research pilot for NASA's Flight Research Center. Manke has already flown all three of the lifting bodies. The X-24B is a joint USAF-NASA flight research program.

-30-

NOTE:

News media wishing to cover
this flight should contact
Ralph Jackson
Public Affairs
NASA Flight Research Center
(805) 258-3311, Ext. 221

July 11, 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE:

Following first flight

Also being released
in Washington, D.C.

FRC RELEASE NO:

17A

X-24B COMPLETES FIRST FLIGHT

The possible forerunner of future aircraft that would be capable of flying in near space made its maiden flight today. The X-24B with John A. Manke, project pilot for NASA's Flight Research Center at the controls, was air launched from a B-52 flying at 13 kilometers (40,000 feet) and glided to a landing on the dry lakebed here four minutes later.

The X-24B is the successor to the wingless lifting bodies that have been flown by USAF and NASA research pilots to demonstrate man's ability to maneuver and safely land a vehicle with a shape primarily designed for space flight. Its configuration is also representative of advanced aircraft of the future that would be capable of sustained cruise flight at hypersonic (5600 kilometers or 3500 mph) speeds.

- MORE -

Following launch Manke, a veteran NASA research pilot, guided the delta-shaped vehicle through a series of maneuvers to evaluate the flight characteristics of the experimental craft. He also made a practice landing approach at high altitude. The civilian research pilot then made a 180 degree landing approach that ended in a 320 kilometer (200 miles) per hour landing on the dry lakebed.

The new shape is based upon studies conducted at the USAF's Flight Dymanics Laboratory. For economic reasons, the new shape was built around the existing X-24A structure and systems by the Denver Division of Martin Marietta. The modification was funded by both NASA and the USAF, and the aircraft is being flown as a giant operation between NASA's Flight Research Center and the USAF Flight Test Center.

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8/1/73

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Flight Research Center
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FOR RELEASE:
1:00 p.m.
August 3, 1973
Also being released in
Houston, Texas

FRC RELEASE NO:
21-73

FORMER ASTRONAUT DAVID SCOTT NAMED AS
DEPUTY DIRECTOR OF NASA FLIGHT RESEARCH CENTER

Colonel David R. Scott, former Astronaut, has been appointed Deputy Director of NASA's Flight Research Center at Edwards, California.

As a NASA Astronaut, Colonel Scott flew on Gemini 8, Apollo 9, and was Spacecraft Commander of Apollo 15. After leaving the Astronaut Corps in 1972, Colonel Scott was named Technical Assistant to the Apollo Program Manager at Johnson Spacecraft Center. Prior to accepting his new position as Deputy Director, Scott served as Special Assistant for Mission Operations and GFE (Government Furnished Equipment) in the Apollo Spacecraft Office. He holds the rank of Colonel in the US Air Force with over 5300 hours of flying time.

-MORE-

On the Gemini 8 mission in 1966, Scott and Command Pilot Neil Armstrong performed the first successful docking of two vehicles in space. As Command Module Pilot for Apollo 9 in 1969, Scott was instrumental in completing the first comprehensive earth orbital qualification and verification test of a "fully configured Apollo spacecraft." In 1971 Colonel Scott commanded Apollo 15 which was the fourth manned lunar landing mission and was the first to visit and explore the Hadley Rille and the Apennine Mountains.

Colonel Scott, 41, received a Bachelor of Science Degree from the US Military Academy in 1954, standing fifth in a class of 633, and the Degrees of Master of Science in Astronautics and Aeronautics and Engineer in Aeronautics and Astronautics from M.I.T. in 1962. He was awarded an Honorary Doctorate of Astronautical Science from the University of Michigan in 1971. He has graduated from the Air Force Experimental Test Pilots School and the Aerospace Research Pilots School.

Among Colonel Scott's special honors are two NASA Distinguished Service Medals, the NASA Exceptional Service Medal, two Air Force Distinguished Service Medals, the Air Force Distinguished Flying Cross, the Air Force Association's David C. Schilling Trophy and the Robert J. Collier Trophy for 1971.

Colonel Scott is a Fellow of the American Astronautical Society, Associate Fellow of the American Institute of Aeronautics and Astronautics, and a member of the Society of Experimental Test Pilots, and Tau Beta Pi, Sigma Xi and Sigma Gamma Tau.

-MORE-

Colonel Scott is married to the former Ann Lurton Ott, who is also from San Antonio, Texas. They have two children.

-30-

Ralph Jackson
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8/3/73

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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FOR RELEASE:

Immediate

FRC RELEASE NO:
27-73

NASA EVALUATING NEW FLIGHT CONTROLLER

NASA is conducting in-flight studies that will aid fighter pilots of the future in the control of their highly maneuverable aircraft.

The side stick flight controller that will be used as the primary controller of the USAF's YF-16 lightweight fighter is being evaluated by NASA's Flight Research Center on board its Digital Fly-By-Wire aircraft.

The YF-16, built by General Dynamics, is one of two prototype aircraft that are under development for possible selection as a new fighter aircraft for the USAF. It is believed that this will be the first time a high performance, highly maneuverable fighter-type aircraft

-MORE-

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9/20/73

will be flown with only a side stick controller instead of the conventional center stick type flight controller.

It is expected that as future high performance types of aircraft are developed with increased maneuverability, pilot seats will become more supine in order to reduce the effects of the increased acceleration or "G" forces on the pilots. For example, present day fighters have seats with angles of approximately 10-15 degrees. The YF-16 will have a seat angle of about 30 degrees.

Conventional pilot control sticks located between the pilot's legs are impractical for conditions like these.

The new side stick controller is of the minimum displacement (or force) type. It does not move and aircraft response is dependent upon how much force is applied by the pilot to the stick.

A similar type of controller is under study using the DFBW F-8 ground based simulator.

Prime purpose of the research program is to provide timely and beneficial information for the Lightweight Fighter Program. It would also provide a base for future side stick and force stick research efforts.

The NASA Digital Fly-By-Wire flight control system is being tested in an extensively modified F-8 that has had its mechanical flight control system removed and is entirely dependent on the electronic system. The new control system is the forerunner of future flight control systems that will make air travel of the future smoother by providing quicker, automatic response from the control system to the aircraft controls.

The YF-16 will use an analog fly-by-wire flight control system.

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FOR RELEASE:
Immediate

Also in Washington, D.C.
FRC RELEASE NO:
28-73

RPRV FIRST FLIGHT SCHEDULED

First flight of a Remotely Piloted Research Vehicle (RPRV) has been tentatively scheduled by NASA's Flight Research Center for October 12. Final date will depend upon the successful completion of several remaining preflight tests.

The new flight research technique was developed by the Flight Research Center and is expected to provide a far more economical method of flight testing experimental air and space craft. The new method should also be less hazardous for various types of flight tests such as spin testing.

First application of the new method is to fly a three-eighth scale model of the USAF's new high performance F-15 fighter at relatively high angles of attack. Eventually, the 23 foot model will be flown through stall and spin maneuvers.

The RPRV will be air launched from a B-52 flying at 45,000 feet. It will then be controlled from a ground control station located within the Flight Research Center by NASA research pilot Einar K. Enevoldson. He will be seated in a special cockpit complete with flight instruments and a television screen. Flight commands will be fed from the pilot through a computer preprogrammed with the flight characteristics and simulated control systems of the F-15, and then telemetered to the RPRV.

Flight information from the RPRV as well as video signals from a television camera installed where the pilot's head or eyes would normally be is transmitted to the ground control station.

-MORE-

After an approximately nine minute flight, the RPRV will descend through 15,000 feet of altitude. At this time, a series of parachutes will deploy a main parachute which will slow the rate of descent.

As the RPRV reaches the lower altitudes, a helicopter will be used to accomplish a mid-air recovery and the research craft will then be lowered to the ground for reuse.

As opposed to other remotely piloted vehicles that use an autopilot type of control system, the test pilot of the RPRV remains in continuous direct control of the test model at all times using conventional full authority flight controls and a complete set of flight instruments. This allows the pilot to perform all of the precision flight maneuvers such as wind-up turns, control pulses and other unusual control maneuvers required for flight test data.

To develop the new technique, Flight Research Center engineers and pilots flew a modified twin-engine aircraft with a preliminary version of the remote control system through its entire envelope, including a ground-controlled landing.

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FRC RELEASE NO:
29-73

FOR RELEASE:
October 23, 1973
Also being released in
Washington, D.C.

Jer

UPSIDE DOWN WING TO FLY

Flight tests of a USAF variable sweep wing F-111 test bed aircraft modified with the NASA supercritical wing airfoil shape are scheduled to begin late this week in a joint USAF-NASA program at NASA's Flight Research Center, Edwards, California.

Purpose of the joint USAF-NASA Transonic Aircraft Technology (TACT) program is to investigate the application of supercritical wing technology to highly maneuverable aircraft in the transonic speed range. The flight tests will be conducted by NASA'S Flight Research Center.

Studies conducted by the USAF's Flight Dynamics Laboratory and others indicated that the supercritical wing would provide a substantial increase in tactical advantage on certain military aircraft, particularly in the transonic speed range where air-to-air combat frequently takes place. These studies indicate that the use of the supercritical wing should provide improved maneuvering capabilities, expanded buffet-free performance and increased high altitude performance.

The new supercritical wing has a shape that is almost directly opposite conventional airfoil shapes. It has a flat top with the rear portion of the bottom side curved upwards. The shape of the airfoil is based upon research conducted by Dr. Richard T. Whitcomb in wind tunnels at NASA's Langley Research Center, Hampton, Virginia.

-more-

These wind tunnel studies show that the new wing shape could delay the rise in aerodynamic drag and allow the aircraft to cruise more efficiently at higher transonic speeds.

Earlier this year, flight tests conducted by NASA's Flight Research Center of a supercritical wing on a modified F-8 jet aircraft demonstrated that the new airfoil permitted the aircraft to operate approximately 15 per cent more efficiently at the design test conditions. The F-8 wing shape tested was representative of a wing that would be used on commercial jet transports.

The General Dynamics F-111 aircraft was selected as the test bed aircraft in the Transonic Aircraft Technology Program because its variable sweep wing capabilities will permit a wide range of conditions for flight tests at speeds ranging from 0.6 Mach (330 mph) to 2.2 Mach (1450 mph). Emphasis will be placed upon the transonic speed range, 0.7 Mach (450 mph) to 1.4 Mach (925 mph).

Data from the TACT program will be used to verify wind tunnel predictions and other ground based studies. Full scale flight demonstrations are also expected to uncover any possible problem areas as well as to help pave the way for production application of future aircraft.

Prime pilots for the program are Major Stu R. Boyd, Air Force Flight Test Center, and Einar K. Enevoldson, civilian research pilot for NASA's Flight Research Center.

-30-

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NEWS
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FLIGHT RESEARCH CENTER
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FOR RELEASE:

October 26, 1973
also being released
in Washington, D.C.

FRC RELEASE NO:

30-73

nov 15

X-24B FIRST POWERED FLIGHT SCHEDULED

The first powered flight of the X-24B has been tentatively scheduled by NASA's Flight Research Center for October 31. John A. Manke, Project Pilot for the Flight Research Center, will be at the controls.

The X-24B is a small experimental craft being flown in a joint USAF-NASA flight research program aimed at providing the technology required for the design of future aerospace craft that would be capable of cruising at hypersonic speeds (Mach 5 plus) at the edge of space.

The X-24B will be air launched from a B-52 flying at 45,000 feet. Following launch, Manke will ignite three of the four chambers of the XLR-11 rocket engine. Approximately 165 seconds of rocket engine burn time is scheduled, which should propel the 8000 pound craft to a maximum speed of 560 mph and peak altitude of 50,000 feet.

Following engine shutdown, Manke will guide the X-24B to a 200 mph glide landing on the dry lakebed here. The flight should last approximately seven minutes.

This will be the sixth flight of the X-24B. Subsequent flights will use the 8000 pound thrust engine to gradually increase the speed and altitude performance. Maximum speeds and altitudes of 1000 mph and 75,000 feet are expected to be attained in future flights.

-30-

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FLIGHT RESEARCH CENTER
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FOR RELEASE:
UPON RECEIPT
(Also being released in Washington, D.C.)

FRC RELEASE NO:
2 - 75

NASA/DOT CONCLUDE AERODYNAMIC DRAG REDUCTION TESTS

Aerodynamic (wind) resistance to tractor-trailer transports using selected add-on aerodynamic aids is reduced 2 to 24 percent, concludes a recent study program aimed at fuel conservation by the Department of Transportation (DOT) and the National Aeronautics and Space Administration (NASA).

Initiated in the spring of 1974, the study program was conducted at NASA's Flight Research Center in Edwards, California.

Increased interest in ground vehicle efficiency has developed with the energy crisis and the resulting high prices and sometimes limited quantities of gasoline and diesel fuel.

The DOT/NASA program evaluated the performance gains of a cab-over-engine trailer with a 45-foot trailer using five different low-cost, aerodynamic drag reduction devices.

Baseline data were gathered on two cab-to-trailer positions with spacings of 62 and 64 inches. At vehicle speeds of 55 mph and without add-on aids installed, aerodynamic drag was 10 percent lower when the distance between the cab and trailer was shorter.

-more-

Aerodynamic drag reductions for the five add-on devices, at 55 mph and zero wind conditions, were:

AERODYNAMIC DEVICE	CAB/TRAILER SPACING (INCHES)	DRAG REDUCTION PERCENTAGE
Device A	62	24
	40	16
Device B	62	14
	40	11
Device C	62	11
	40	11
Device D	62	3
	40	2
Device E	62	19

Limited data were also obtained with crosswinds for the basic configuration and for some modified configurations. These data show that the drag of the configurations with add-on devices was sensitive to crosswinds. Although the data do not define wind effects in detail, they indicate that in general the crosswinds reduced the ability of the add-on devices to decrease drag.

It is generally believed that additional testing (possibly in wind tunnels) should be conducted to study the effects of crosswinds.

Device A, which was cab-mounted, was 67 inches wide and 32 inches high. Device B, also cab-mounted, was 52 inches wide and

-more-

27 inches high, with a 6.5 inch gap between the device and the cab. Device C was trailer-mounted and extended a maximum of 24 inches forward of the trailer. Device D was mounted on the top front edge of the trailer, with a 6 inch gap between the front edge of the device and trailer and a 1.5 inch gap between the rear edge of the device and trailer. Device E was 60 inches wide, cab-mounted and extended vertically 48 inches above the cab in the stored position and 38 inches above the cab in the fully deployed position. The deployment and storage of Device E was automatic and depended on the impact pressure and its variation with velocity. Data for this device were acquired only for the fully deployed position and the rear trailer location (62 inch gap).

These add-on devices, which are commercially or potentially available, were developed by private business concerns to reduce the aerodynamic drag of existing tractor-trailer transports, requiring only minor modifications to the vehicles.

Tests were conducted on a representative tractor-trailer without aerodynamic reduction aids and then repeated with the add-on devices installed. Test vehicle speeds ranged from approximately 30 to 65 mph and included some tests where the air flow was made visible with a powder emitted at the top edge of the cab.

The tests, which occurred during calm wind conditions, recorded vehicle deceleration, and ambient pressure, temperature and wind velocity and direction.

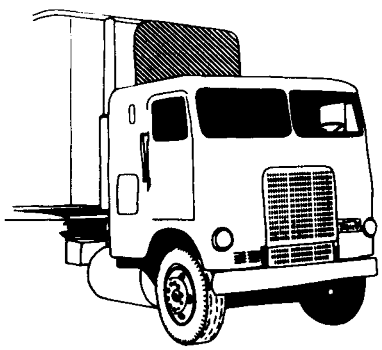
The Transportation Systems Center, on behalf of the Department's

Office of Assistant Secretary for Systems Development and Technology, performed simulations to evaluate the changes and fuel economy from the drag reduction.

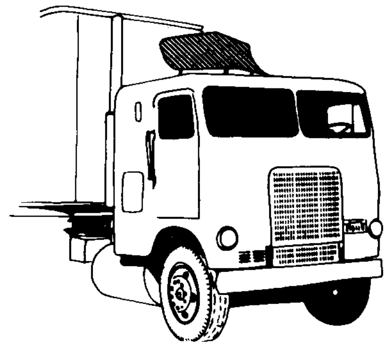
-frc-

NOTE: Black and white glossies of the attached figure may be obtained from the Public Affairs Office, NASA Flight Research Center (805) 258-3311, ext. 221.

DEVICES TESTED



DEVICE A



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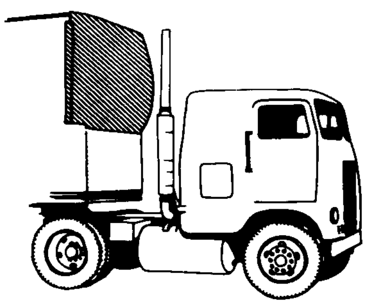
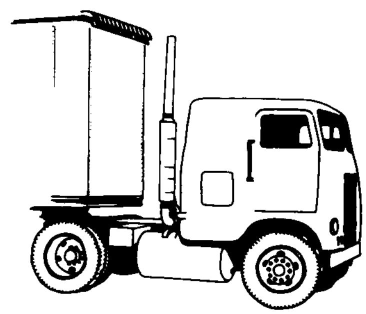
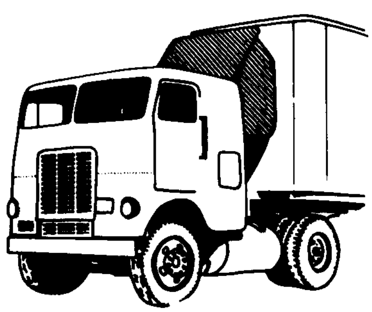


DEVICE C



DEVICE D



DEVICE E

NEWS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FLIGHT RESEARCH CENTER
P. O. BOX 273
EDWARDS, CALIF. 93523

FOR RELEASE:
Monday, March 3

FRC RELEASE NO:
3-75

RPRV TO HAVE LANDING GEAR INSTALLED

A landing gear system is being added to NASA's Remotely Piloted Research Vehicle (RPRV) which will enable it to be landed under the control of a ground-based pilot.

Use of the landing gear will replace the mid-air recovery technique utilizing parachutes and helicopters which has been used up to this time.

Developed by NASA's Flight Research Center, the RPRV method provides a more economical and far less hazardous means of testing advanced aircraft. It involves air launch of large scale models (up to 30 feet long) from a carrier aircraft. A test pilot in a ground cockpit complete with flight controls and flight instruments flys the RPRV through the desired test maneuvers using telemetry and television.

-more-

First application of the RPRV method uses a 3/8 scale model for spin-testing of the Air Force F-15 fighter.

Two main skids, 20 inches long, and a 20-inch long nose skid will be installed on the 23-foot long model aircraft using pneumatic shock absorbers. Prior to the landing approach, the pilot sends an electronic signal which permits the shock absorbers to extend the gear.

A television camera mounted in the cockpit of the RPRV provides visual information to the pilot. This camera is presently being flown on board a twin-engine propeller-driven Piper PA-30 aircraft to optimize the system.

In addition to the F-15 RPRV, a similar type landing gear system will be used for the recovery of two future RPRVs which will be flown by the NASA Flight Research Center utilizing jet-powered Firebee IIs capable of supersonic speeds.

First flight of the RPRV with the landing gear is expected this summer.

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FOR RELEASE:
ON RECEIPT
(Also being released
in Washington, DC)

FRC RELEASE NO:
4-75

NASA RESUMES FLIGHT INVESTIGATION OF AIR TURBULENCE

Invisible air turbulence, a natural phenomenon that can bump airplanes around without warning, will be investigated in a NASA flight research program.

NASA's Flight Research Center, Edwards, CA, is flying a specially instrumented B-57 aircraft to gather detailed air turbulence measurements in meteorological conditions such as jetstreams, thermal turbulence and mountain waves. Devices on board the aircraft will measure the amount of energy in the various turbulence samples.

Data from the flights will be analyzed by NASA's Langley Research Center, Hampton, VA, for use in designing future aircraft to insure safe flight in turbulent air.

-more-

The Federal Aviation Agency and the National Oceanic and Atmospheric Administration will report the locations of clear air turbulence. NASA will fly the B-57 through the turbulence on a straight line course for at least 10 minuted at altitudes ranging up to 15,000 meters (50,000 feet).

A meteorologist in the rear of the two-seat aircraft will record the velocity and acceleration of the turbulence, using inertial navigation equipment.

The program, called MAT for Measurement of Atmospheric Turbulence, includes approximately 40 flights over the western portion of the U.S. during the winter and spring months.

The project is a continuation of a similar program flown in 1972, but will use an improved instrumentation system for greater accuracy.

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FOR RELEASE:
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FRC RELEASE NO:
7-75

ROCKWELL TO DEVELOP TWO AIRCRAFT TEST VEHICLES FOR NASA

Two subscale models of a highly maneuverable aircraft using advanced and experimental technology will be built for NASA's Flight Research Center, Edwards, CA.

The need for advanced maneuvering capability in future aircraft was identified in a joint DOD/NASA study. It appears that major improvements are possible through simultaneous application of new technology from various technical disciplines.

Rockwell International Corporation has been selected by NASA for negotiation of a cost-plus-fixed-fee contract to design and fabricate the two vehicles. The contractor's proposed cost for the 30-month effort is approximately $13 million. Negotiations

-more-

are expected to be concluded in May. Two other firms submitted proposals for this effort: Grumman Aerospace Corporation, Bethpage, Long Island, NY and McDonnell Aircraft Company, St. Louis, MO.

The two-phase contract is part of NASA's Highly Maneuverable Aircraft Technology Program. The first phase is a 60-day effort which calls for Rockwell International to perform detailed program planning.

Upon satisfactory completion of the program planning phase, NASA will approve initiation of final design and fabrication. Delivery of the two vehicles to the Flight Research Center is expected in late 1977.

The two unmanned vehicles will be flown utilizing the Remotely Piloted Research Vehicle test technique developed by NASA's Flight Research Center. Remotely Piloted Research Vehicles are air-launched from a larger, carrier aircraft and then, using television, telemetry and radar, the test craft is flown through the desired maneuvers by a pilot located in a ground cockpit.

This technique provides a highly cost-effective means of flight testing advanced, high risk technology without the associated risks to the test pilots.

The contract will be under the technical direction of the NASA Flight Research Center.

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4/15/75

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FOR RELEASE:
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FRC RELEASE NO:
8-75

NASA TESTS NOISE FROM BUSINESS JETS

The NASA Flight Research Center, Edwards, CA, has begun flight tests this week to measure the noise levels of five business class jet aircraft during various types of landing approach maneuvers.

The objective of the cooperative industry-government program is to establish noise characteristics for this class of aircraft and to determine effectiveness of alternate landing approach procedures in reducing community noise levels.

Under the most recent noise level limits proposed by the Federal Aviation Agency, some aircraft in this class may be restricted from using some airports.

The FAA and the Environmental Protection Agency are participating with NASA in the program. The aircraft industry, through the National Business Aircraft Association, will provide four airplanes with crews for the tests. A fifth aircraft, a Lockheed JetStar, will be provided by NASA.

NASA Flight Research Center pilots will fly the test runs with the company pilots acting as safety pilots.

Each of the aircraft will fly four different types of landing approaches over a microphone array: a normal three-degree approach for baseline information; a three-degree decelerating approach with the engines at reduced power settings; a four-degree approach with normal power settings; and a two-segment approach which starts at a six-degree angle and, upon reaching the three-mile mark, shallows into a three-degree approach.

Besides the NASA/Lockheed JetStar, other aircraft involved in the tests include a Rockwell Saberliner, a Grumman Gulfstream II, a Gates Lear Jet and a Beech-Hawker 125.

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4/17/75

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FOR RELEASE:
Immediate

FRC RELEASE NO:
9-75

SCOTT NAMED FLIGHT RESEARCH CENTER DIRECTOR

Dr. David R. Scott has been named as Director of NASA's Flight Research Center, Edwards, CA. The announcement was made today by Dr. Alan M. Lovelace, NASA Associate Administrator for Aeronautics and Space Technology.

Scott, 42, was the former Deputy Director of the Flight Research Center, and replaces Lee R. Scherer who was named last December as the Director of the John F. Kennedy Space Center in Florida.

The Flight Research Center is NASA's major field center for the flight testing of high speed aircraft and other experimental vehicles. The Approach and Landing Tests of the Space Shuttle

-more-

Orbiter will be carried out here as well as the recovery of the spacecraft from the initial orbital flights.

As a NASA astronaut, Scott was the Commander of the Apollo 15 flight, the first extended scientific exploration of the Moon, and flew on the Apollo 9 and Gemini 8 space flights. He has logged 546 hours and 54 minutes in space.

Scott, a retired USAF Colonel, graduated from the US Military Academy at West Point, standing fifth in a class of 633, with a Bachelor of Science degree in 1954. He received a Master's degree in Science and Astronautics from the Massachusetts Institute of Technology in 1962 and an Honorary Doctorate of Astronautical Science from the University of Michigan in 1971.

Among Scott's special honors are two NASA Distinguished Service Medals, the NASA Exceptional Service Medal, two Air Force Distinguished Service Medals, the Air Force Distinguished Flying Cross, The Air Force Association's David C. Schilling Trophy and the Robert J. Collier Trophy for 1971.

Born June 6, 1932 in San Antonio, TX, Scott is the son of Brigadier General (USAF Retired) and Mrs. Tom W. Scott of La Jolla, CA. He is married to the former Ann Lurton Ott. The couple and their two children reside in Lancaster, CA.

Scott is a Fellow of the American Astronautical Society, Associate Fellow of the American Institute of Aeronautics and Astronautics, and a member of the Society of Experimental Test Pilots, and Tau Beta Pi, Sigma Xi and Sigma Gamma Tau.

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4/18/75

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FOR RELEASE:
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FRC RELEASE NO:
11-75

NASA TO FLY YF-17

The YF 17 aircraft, contender in the recent Air Force air combat fighter competition, will be flown by NASA's Flight Research Center, Edwards, CA in an abbreviated research program.

The twin-engine aircraft with high performance and maneuverability will be used to acquire flight data of a high performance aircraft for comparison with predictions obtained from wind tunnels and other analytical methods. This information will then be used to update prediction techniques required for the design of future highly maneuverable aircraft.

Specific objectives include performance and stability at high angles of attack at both high and low altitudes, maneuvering buffet

-more-

tests and pilot physiological studies during sustained high acceleration levels.

Under the terms of the agreement with the USAF, NASA Flight Research Center pilots will fly the YF-17 aircraft and Northrop Corporation, Hawthorne, CA, builders of the aircraft will maintain them. NASA will transfer funds to the USAF to extend the existing USAF/Northrop contract for about 25 flight hours.

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5-1-75

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FOR RELEASE:
Immediate

FRC RELEASE NO:
12-75

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NASA SELECTS SERV-AIR FOR SUPPORT CONTRACT NEGOTIATIONS

The NASA Flight Research Center, Edwards, CA, has selected Serv-Air, Inc., Houston, TX for negotiations of a cost-plus-award fee contract for administrative technical support services. The contractor's proposed cost is approximately $1.8 million.

The one-year contract, with renewal options for two additional one-year periods, encompasses two major performance areas: facilities operations and maintenance; and inventory management.

Serv-Air will be responsible for the administrative and programmatic support necessary to operate and maintain the NASA Flight Research Center. The contractor shall also be responsible for the inventory management system at the Center.

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FOR RELEASE:
Immediate
2 June 1975

FRC RELEASE NO:
14-75

SPACE SHUTTLE FACILITIES TO BE BUILT

A $3.56 million contract for the construction of facilities to be used in the Approach and Landing Tests (ALT) of the Space Shuttle as well as the initial landings from Earth orbital flights will be awarded early this month by the National Aeronautics and Space Administration.

The contract will be awarded to the apparent low bidder, Santa Fe Engineers, Incorporated, Lancaster, California. NASA's John F. Kennedy Space Center, Florida, which has been designated as the prime launch and recovery site for the reusable Space Shuttle and is responsible for Shuttle facilities, will award the contract.

The new facilities will be constructed at NASA's Flight Research Center, Edwards, California, where the ALT of the Space Shuttle Orbiter will begin in early 1977. Initial orbital flights will also be recovered here in 1979 and will use the same facilities.

Eventually, the facilities will be used in support of NASA's aeronautical research programs.

The contract calls for the construction of a 25,000 square foot hangar, associated shop areas, taxiways and other support facilities.

Completion of construction is planned for September 1976. Santa Fe was the lowest of eight bidders.

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FOR RELEASE:

Immediate

11 June 1975

FRC RELEASE NO:

15-75

RUCKER NAMED FLIGHT RESEARCH CENTER PROCUREMENT HEAD

Lawrence W. Rucker has been named as the new Director of the Procurement and Supply Division at the National Aeronautics and Space Administration's Flight Research Center, Edwards, CA.

Rucker comes to the Center after working with procurement at Edwards Air Force Base, where he served from 1968 as Deputy Chief of Procurement and Chairman of the Procurement Committee. His duties there included assisting in the management of the Procurement Division and responsibility for technical procurement aspects of contractual actions. Prior to this he served as Chief of the R&D Contracts Branch.

Rucker served in the U.S. Air Force from 1950-1955. He

-more-

attended Syracuse University in New York and Golden Gate University in San Francisco, CA, where he obtained his Master's Degree in Business Administration in 1971.

He is the author of several technical papers on procurement and contracts, and has served as president and director of the local branch of the National Contract Management Association.

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FOR RELEASE:
IMMEDIATE
16 June 1975

FRC RELEASE NO:
16-75

REDIESS NAMED NASA RESEARCH DIRECTOR

A former college student who spent his summers working as an engineering technican at NASA's Flight Research Center has been named as Director of Research for the same institution.

Dr. Herman A. Rediess who began his career with NASA in 1955 while attending the University of California at Berkeley will now be responsible for the planning and direction of all disciplinary aeronautical research activities at the

NASA Flight Research Center.

Following his graduation in 1959, Dr. Rediess joined NASA as an aeronautical engineer. He received his M.S. degree from the University of Southern California in 1964 and his Ph.D. in Aeronautical and Astronautical Engineering from the Massachusetts Institute of Technology in 1969.

Born on April 2, 1939, in Pinneo, CO, Dr. Rediess has specialized in stability and control research. He was formerly Deputy Director of Vehicle Dynamics and Control at the Flight Research Center.

The author of many technical reports and the member of several technical societies, Dr. Rediess resides in Lancaster, CA, with his wife Sharon and their two children.

-frc-

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NASA News

National Aeronautics and
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RELEASE NO: 17-75

For Release: Immediate
19 June '75

NASA TO STUDY F-8 OBLIQUE WING FEASIBILITY

The NASA Flight Research Center, Edwards, CA, has awarded a $146,100 cost plus fixed fee contract to the LTV Aerospace Corporation, Vought Systems Division, Dallas, TX, to study the feasibility of flight testing the oblique wing on an F-8 jet aircraft.

The oblique wing was developed by Dr. Robert T. Jones of NASA's Ames Research Center, Mountain View, CA. It involves mounting a straight wing on the top of an aircraft in such a manner that it can be swiveled around a central pivot point.

The wing would be fixed at zero degrees or perpendicular to the fuselage for landing and take-off and then moved to various sweep positions for the best performance at different speeds.

Ames wind tunnel studies indicate that the new design could operate with maximum efficiency over a wide speed range and offer increased speed and/or significant fuel savings.

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The contract is a preliminary study by NASA to investigate the technical problems involved in modifying the test airplane to accept the new wing and associated mechanical systems and to project a cost estimate for the modifications.

The contract is jointly funded by NASA's Ames and Flight Research Centers.

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RELEASE NO:

19-75

For Release: IMMEDIATE
(Also being released
in Washington, DC)

M-2 LIFTING BODY GOES TO SMITHSONIAN

The first of the heavyweight wingless lifting bodies that helped pave the way for the Space Shuttle has begun its last trip.

The rocket-powered M-2 lifting body is being trucked from its original home at the NASA Flight Research Center to a place of honor at the Smithsonian Institution's new Air and Space Museum in Washington.

Confidence in lifting entry, according to the man who made the first flight in the experimental craft, was the most significant result of its six-year flight research program. Milt Thompson, who piloted the first M-2 flight on July 12, 1966, said, "During this time period, our space effort was pretty well concentrating on capsules as vehicle shapes. I think that our flights dramatically demonstrated that it is well within man's capability to successfully maneuver and safely land a vehicle with a shape that was designed for lifting reentry from space flight and horizontal landing."

Thompson, who retired from test piloting in 1966, is now Chief Engineer for NASA's Flight Research Center.

The M-2 is a half-conical in shape with a rounded blunt nose and vertical fins. Wingless, it achieves its aerodynamic lift for flight from the shape of its body.

The 25-foot long research craft was air launched from a B-52 mothership flying at 45,000 feet. Following launch the pilot would ignite a small rocket engine to climb to altitudes of 70,000 feet and speeds in excess of 1000 m.p.h. Following engine shutdown, the pilot would then maneuver the craft to a glide landing on the dry lake bed here.

The M-2 made 43 flights and was flown by seven different NASA and USAF pilots. On its 16th flight, the M-2 turned over several times during landing, severly injuring the pilot Bruce Peterson and seriously damaging the craft. It was rebuilt and returned to active flight status.

(This accident provided the basis for the fictional book that was turned into the television series Six Million Dollar Man.)

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RELEASE NO: 22-75

For Release: IMMEDIATE

NASA TO EVALUATE FLIGHT CONTROL SYSTEMS

In an effort to improve aircraft ride qualities, flight-testing of an advanced attitude command flight control system was begun this week under a joint NASA/university/industry program.

The test program, carried out under the direction of NASA's Flight Research Center, Edwards CA, is also expected to prove that the system can reduce pilot workload and improve flight safety.

The separate-surface active control system for general aviation aircraft, developed and extensively ground-tested by the University of Kansas, has been installed on a Beechcraft Model 99 commuter airliner. The flight test plan includes functional tests, envelope expansion, system optimization, a quantitative evaluation, and a qualitative evaluation by three test pilots.

-MORE-

Approximately one-third of each aircraft control surface is controlled by the new automated avionics system. The remaining two-thirds are pilot-controlled.

With the avionics in the off condition, the separate-surfaces follow the pilot's commands and the control system is effectively that of a basic airplane. With the automatic system activated, the separate-surfaces operate independently of pilot inputs to cause the airplane to assume and maintain attitudes commanded from the pilot's control wheel.

The pilot's two-thirds control authority allows him to over-control the effects of the separate-surfaces in the event of automatic system malfunctioning.

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NASA News

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RELEASE NO: 24-75 For Release: IMMEDIATE

X-24B TO MAKE A RUNWAY LANDING

The next flight of the experimental X-24B will end with a glide landing on a concrete runway instead of the dry lakebed. The flight has been scheduled by NASA's Flight Research Center for August 5.

This will be the first time that a wingless aircraft has ever attempted a runway landing.

The landing is planned for the 15,000-foot long main runway at Edwards Air Force Base.

Purpose of the landing is to demonstrate the ability of a pilot to maneuver an unpowered vehicle to a landing on a conventional runway with its associated physical limitations, instead of on the almost unlimited dry lakebed.

-more-

John A. Manke, chief X-24B project pilot for NASA's Flight Research Center will be at the controls of the rocket powered aircraft. Lt. Col. Mike Love, Air Force Flight Test Center X-24B project pilot, will be the flight controller. Love is scheduled to also make a runway landing on his next flight.

The X-24B is a 37-foot long delta shaped vehicle which is being flown in a joint NASA-USAF program. Purpose of the program is to study the transonic flight characteristics of an aerodynamic shape that could be the forerunner of future aircraft that would cruise at hypersonic speeds in near space.

The 13,000 pound craft will be air-launched from a B-52 carrier aircraft flying at 45,000 feet near Cuddeback, a dry lakebed 25 miles northeast of here. Following launch, Manke will ignite a small rocket engine which should propel the X-24B to a maximum speed of 1000 mph and altitude of 70,000 feet.

After engine shutdown, he will maneuver the X-24B to the landing pattern here. The flight should last approximately seven minutes.

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7/25/75

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Rec'd 8/22/75

RELEASE NO: 26-75 For Release: IMMEDIATE

NASA'S RPRV MAKES FIRST UNPOWERED LANDING

The first unpowered landing of a Remotely Piloted Research Vehicle (RPRV) was made last week by NASA's Flight Research Center, Edwards, CA.

RPRV is a technique developed by NASA's Flight Research Center which provides a more economical and far less hazardous means of flight test. The new method involves the air launch of large scale models from a carrier aircraft flying at high altitudes. A test pilot located in a ground cockpit complete with flight instruments and flight controls then flies the RPRV through the desired test maneuvers using telemetry and television.

-more-

The present application of the RPRV technique is in stall/post-stall/spin tests of a three-eighths scale model of the USAF F-15 fighter and is being conducted in support of the F-15 full scale flight test program.

Originally, the RPRV was recovered using a parachute and helicopter for a mid-air recovery. However, since results were less than 100 percent, it was decided to develop an independent landing capability.

Last week, Center Project Pilot Einar Enevoldson brought the RPRV to a landing on the dry lakebed here, using small steel skids which had been individually mounted on the ends of three conventional automobile shock absorbers. The shock absorbers were installed inside of the aircraft's fuselage and compressed to allow the skids to fit flush with the bottom of the aircraft.

When Enevoldson was ready to lower the landing gear, he electronically sent a signal which released the gear and allowed the compressed nitrogen system to extend the skids.

For this flight, the RPRV was air-launched from a B-52 flying at 48,000 feet. The 24-foot long aircraft was then flown into a spin and maneuvers performed to measure control effectiveness during spinning flight. The spin was continued until an altitude of approximately 15,000 feet was reached, at which time the landing gear was deployed and a series of stability and

-more-

control maneuvers were flown.

Final approach to the runway on the dry lakebed began at about 5000 feet. A television camera in the cockpit of the RPRV provided visual information to the ground pilot.

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8-75

NASA News

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RELEASE NO: 29-75

For Release: IMMEDIATE

ADVANCED PROPULSION SYSTEM MAKES FIRST FLIGHT

A new propulsion control system that could increase the efficiency of future high speed aircraft made its first flight today on board a variable-sweep wing F-111. Called the INtegrated Propulsion Control System (IPCS), the digital computer-controlled system is being evaluated in flight by NASA's Flight Research Center.

The IPCS uses digital electronics instead of conventional hydromechanical controls of the aircrafts supersonic jet engine and engine inlet. The new system which integrates engine and inlet is expected to allow aircraft to be flown at their full performance limits without adverse interaction.

On today's flight, the modified inlet and the Pratt and Whitney aircraft TF 30 engine were operated from take-off to landing throughout

-more-

the one-hour flight under the control of a Honeywell HDC-601 digital computer. Routine transfers between digital and hydromechanical control were made at all flight conditions. The F-111, piloted by NASA's Gary Krier and the USAF's Major Stan Boyd, was flown at speeds in excess of Mach 2 with the IPCS operating.

After 30 months of analysis, design and ground test, the first flight occured on schedule. Prior to the first flight, the engine was tested at simulated altitude conditions at the NASA Lewis Research Center. Today's flight begins the final phase of a three-year contract awarded to the Boeing Aerospace Company by the USAF Aero Propulsion Laboratory.

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9-75

NASA News

National Aeronautics and
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RELEASE NO: 30-75

For Release: Monday,
September 22

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NASA SCHEDULES FINAL ROCKET-POWERED RESEARCH AIRCRAFT FLIGHT

The only rocket-powered aircraft known to be flying today, the USAF/NASA X-24B, has been scheduled for its final rocket-powered flight on September 23 by NASA's Flight Research Center, ending another era in experimental rocket-powered flight test.

The rocket-powered airplane has been one of this country's most valuable tools of advanced aeronautical research and has made many contributions both to future airplanes and to manned space flight.

The research airplane program was first initiated in 1944 by NASA's predecessor, the National Advisory Committee for Aeronautics (NACA), the USAF and the Navy. There were two

-more-

general categories of research aircraft: those like the X-3, X-4 and the X-5 which were flown to study new and unconventional configurations; and the rocket-powered aircraft which were flown to extend speed and altitude performance.

Limited success in rocket-powered flight had been achieved earlier by the Germans and the French. The first of the "pure" (no other source of propulsion) rocket-powered aircraft in this country was the XS (Experimental Sonic) -1, which made its first powered flight on December 9, 1946 with Bell test pilot Chalmers (Slick) Goodlin at the controls. Later called just the X-1, this aircraft made history on October 14, 1947 when then-Captain Charles E. Yeager, USAF, piloted the X-1 on the world's first supersonic flight.

The second kind of rocket-powered craft was the D-558 II Skyrocket. On November 20, 1953 NACA pilot A. Scott Crossfield piloted this craft to the world's first Mach 2 (twice the speed of sound) flight.

From 1954 through 1958 the X-1A, X-1B and X-1E, growth versions of the X-1, continued to expand the limits of manned flight to speeds of 1500 mph and altitudes up to 90,000 feet.

The X-2 was the first aircraft to fly faster than three times the speed of sound and the first to exceed 100,000 feet.

Probably the most successful of all the rocket-powered research aircraft was the X-15. Three of these aircraft made 199 flights between 1959 and 1968 which extended the frontiers of aerodynamic flight into space itself. World records of 354,200 feet and 4520 mph (Mach 6.7) were established with the hypersonic aircraft.

-more-

The final group of aircraft which depended upon rocket propulsion did not go higher or faster, but was used to test new and unconventional configurations. Called lifting bodies because they did not have wings and obtained their aerodynamic lift for flight from their body shape, the experimental craft were flown to determine if man could maneuver and safely land lifting entry-type spacecraft on the ground like conventional aircraft.

Using the same small rocket engines which were used 20 years earlier in the X-1, the lifting bodies were flown in the transonic speed range to verify wind tunnel predictions. A top speed of 1200 mph and a peak altitude of 90,000 feet were attained.

The forthcoming flight of the X-24B will be piloted by William H. Dana, a civilian research pilot for NASA's Flight Research Center. The X-24B will be air-launched from a mother-ship to conserve fuel, in the same manner as all previous pure rocket-powered aircraft (except for one ground take-off demonstration of the X-1).

Following launch, Dana will ignite the XLR-11 rocket engine and accelerate to a speed of approximately 1000 mph and an altitude of about 70,000 feet. Following engine shutdown, he will then maneuver to a 200 mph glide landing on the dry lakebed here.

Although this will be the final rocket-powered flight of the joint USAF/NASA X-24B, six more glide flights are planned.

-frc-

AIRCRAFT	DATES FLOWN	FLIGHTS	MAX SPEED (mph)	(Mach)	MAX ALTITUDE (in feet)	MANUFACTURER	ENGINE
X-1 (3 airplanes)	1946-51	156*	957	1.45	71,902	Bell Aircraft Co.	Thiokol XLR-11 (6000 lbs thrust)
X-1A	1953-58	21	1612	2.435	90,440	" " "	" "
X-1B	1953-58	27	1282			" " "	" "
X-1D	1953-58	1	subsonic			" " "	" "
X-1E	1955-58	26	1471		73,458	Bell/NASA	" "
X-2 (2 airplanes)	1955-56	20	2094	3.20	126,200	Bell Aircraft Co.	Curtis Wright XLR-25 (15,000 lbs thrust)
D-558 II (3 airplanes)	1948-56	161**	1291	(2.005)	83,235	Douglas Aircraft Company	Thiokol XLR-8 (6000 lbs thrust)
X-15 (3 airplanes)	1959-68	199	4520	(6.70)	354,200	Rockwell Intl. Corporation	Thiokol XLR-99 (59,000 lbs thrust)
M-2 (2 aircraft)	1966-72	43	1064	1.673	71,501	Northrop Corp.	Thiokol XLR-11 (8000 lbs thrust)
HL-10	1966-70	37	1228	1.861	90,303	" "	" "
X-24A	1969-71	28	1036	1.60	71,400	Martin Marietta Corporation	" "
X-24B	1973-75	29	1158	1.752	74,132	" "	" "

NOTE: * - Includes 10 flights at Pinecastle AFB, FL; all the rest having been flown at Muroc (Edwards) AFB.
** - Includes 74 flights that were combination jet and rocket-powered.

One X-1 flight and 27 D-558 II flights were ground take-off flights; all others were air-launched. The total of 748 flights includes glide flights.

NASA News

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NASA TO FLY F-15

The NASA Flight Research Center will soon accept the first of two F-15 fighter aircraft. The new high performance aircraft are being ~~loaned~~ lent to NASA by the Air Force for an undetermined period of time.

The Flight Research Center will fly the two aircraft in a joint NASA/USAF effort aimed at improving aircraft design prediction techniques for future high performance aircraft. The F-15 flight test data will be correlated at NASA's Ames, Langley and Lewis Research Centers, and the Air Force.

The NASA program, which was requested by both the USAF and the USN, will attempt to determine the cause for discrepancies between predicted and measured values of drag and to develop

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improved methods of prediction.

In addition, data from F-15 flights will be used to validate data from 3/8 scale models of the F-15 that are being flown by the Flight Research Center to study stall/spin flight characteristics. These 23-foot long models are being flown using a Remotely Piloted Research Vehicle (RPRV) technique that will be used to flight-test future aircraft.

The two NASA F-15 aircraft are being updated by McDonnell Douglas, builders of the F-15, for the program.

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NASA News

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NASA GIVES ROCKWELL HiMAT CONSTRUCTION GO-AHEAD

NASA has given approval to Rockwell International Corp. to begin final design and construction of two subscale models of a highly maneuverable aircraft incorporating advanced technologies for potential future manned aircraft.

The two unmanned models will be flown by the NASA Flight Research Center, Edwards, CA in a joint NASA/USAF program to develop advanced technology for high maneuverability using new technology from various technical disciplines.

The Rockwell design calls for a 6.3-meter (21 feet) long subscale model with a "Coke bottle" fuselage shape. Two large canards are mounted on each end of the 4.5-meter (15 ft.) wing. Twin vertical tails are located on booms off the wing trailing edge.

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The "HiMAT" vehicle will be powered by a General Electric J85 engine, providing a supersonic flight capability. A maneuvering capability of eight "g"s is planned for the unmanned aircraft. Empty, the HiMAT will weight 1,260 kilograms (2,800 pounds).

The two unmanned vehicles will be flown using the Remotely Piloted Research Vehicle test technique developed by NASA's Flight Research Center. Remotely piloted research vehicles are air-launched from a larger carrier aircraft and then, by using television, telemetry and radar, the test craft is flown through desired maneuvers by the pilot located in a ground cockpit.

This technique provides a highly cost-effective means of flight-testing advanced, high risk technology without associated risks to the test pilots.

An $11.8 million contract was awarded to Rockwell last summer. The first 60-day phase of the contract was to perform detailed program planning. Approval for final design and construction was dependent upon NASA acceptance of this planning.

Delivery of the two vehicles to the NASA Flight Research Center is expected in late 1977.

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DEPUTY DIRECTOR NAMED FOR NASA FLIGHT RESEARCH CENTER

William H. Rock, Manager, Sciences, Applications and Apollo-Soyuz Test Program Office and Director of Information Systems for the Kennedy Space Center, has been named Deputy Director of the NASA Flight Research Center at Edwards, California.

While at Kennedy Space Center, Rock was responsible for the overall program management for the Apollo-Soyuz Test Program Office, assigned space sciences and applications projects, and was responsible for other programs using residual Apollo or Skylab flight hardware. He also managed the KSC Information Systems activities which included telemetry, data acquisition, systems analysis and

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engineering related to existing management and information systems.

Rock joined NASA in 1964 as a Quality Assurance Engineer at the Goddard Space Flight Center. In 1967 he was assigned to NASA Headquarters, Office of Manned Space Flight, where he planned and formulated the QA policy and procedures for the Apollo Applications Program. In 1968 he was appointed Chief, Reliability and Quality Assurance Office at KSC. Prior to joining NASA, Rock was a Quality Engineer for Martin-Marietta with QA responsibility for that company's lifting body space vehicle program.

Rock received a Bachelor of Engineering Science degree from Johns Hopkins University in 1958 and has also done graduate level work there. He was born in Williamsport, Pennsylvania in 1936. Rock is married and has three children.

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NASA News

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Trudy Tiedemann
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NASA HONORS LOCAL PILOTS, X-24B PROJECT

Three experimental test pilots and one special project at NASA's Flight Research Center, Edwards, CA were honored in ceremonies held today in Washington, D.C.

John A. Manke, chief lifting body pilot for the NASA Flight Research Center, and Lt.Col. Mike Love, X-24B project pilot for the USAF Flight Test Center, received the NASA Exceptional Service Medal. The same award was presented posthumously to veteran rocket-aircraft test pilot John B. McKay, and accepted by his widow, Mrs. Shirley McKay.

The NASA Group Achievement Award was presented to the X-24B Project Team and was accepted on behalf of the entire USAF-NASA

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team by Jack L. Kolf.

Dr. James C. Fletcher, Admininstrator of the National Aeronautics and Space Administration, presented the awards.

Lt.Col. Love was honored for his service as the USAF project pilot on the X-24B. Manke received his award for his performance as a prime pilot on the entire manned lifting body program. McKay was honored for his service as a pioneering test pilot in the initial exploration of the supersonic and hypersonic regions of flight.

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FINAL X-24B FLIGHT SCHEDULED

The final flight of the X-24B has been scheduled for Wednesday, November 26. Tom McMurtry, a civilian research pilot for the NASA Flight Research Center, will fly the experimental craft.

The X-24B is the successor to the M-2 and HL-10 lifting bodies which have been instrumental in demonstrating man's ability to maneuver and safely land a vehicle that was designed for Earth reentry from space flight. Data from the X-24B will also be used to help provide the technology for the development of future aircraft capable of hypersonic (Mach 5+) speeds.

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The delta-shaped craft will be carried to a launch altitude of 45,000 feet by a B-52 mother ship. Following launch, McMurtry will pilot the X-24B through a series of maneuvers designed to evaluate its stability and control. He will then make a 200-mile per hour glide landing on the dry lakebed here.

The X-24B, a highly modified version of the X-24A, was first flown in the joint USAF/NASA research program on August 1, 1973 by John A. Manke, chief X-24B project pilot for the NASA Flight Research Center. Two other pilots, Lt.Col. Mike Love, chief project pilot for the Air Force Flight Test Center, and William Dana, NASA's Flight Research Center, also flew the X-24B through its flight research program which concluded on August 23, 1975.

During the 30-flight research program, the X-24B used a small rocket engine to propel the 37-foot craft to a maximum speed of 1110 mph (1.68 times the speed of sound) and peak altitude of 73,000 feet.

Following the conclusion of the flight research program, a series of pilot checkout flights was begun. Three pilots - USAF Capt. Francis R. Scobee, and Einar Enevoldson and Tom McMurtry, both of NASA, each made two glide flights in the X-24B.

All but two of the X-24B recoveries were made on the dry lakebed. The other two flights landed on the concrete runway at Edwards Air Force Base.

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